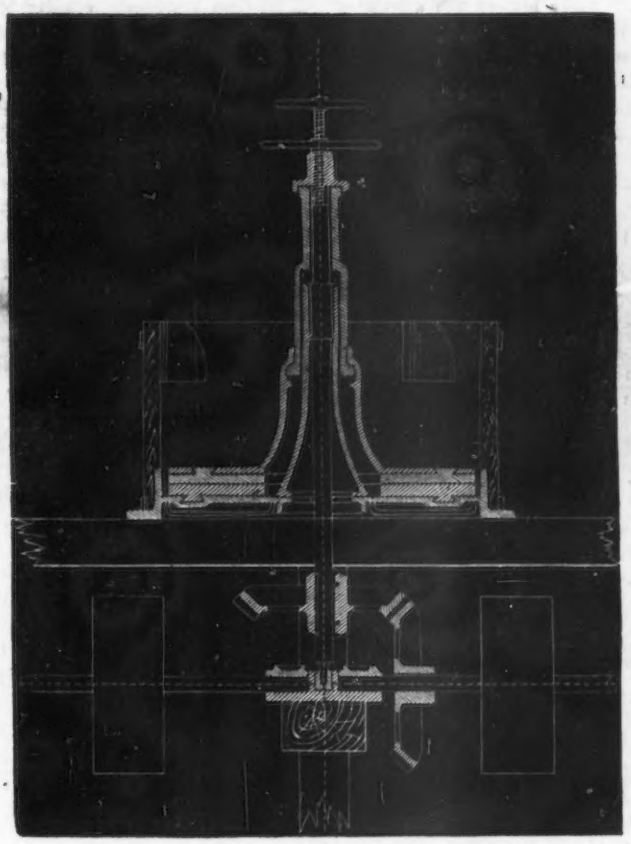
THE ENGINEERING AND MINING JOURNAL.

VOL. XV.—No. 2.—FOURTH SERIES. NEW YORK, TUESDAY, JANUARY 14, 1873. PRICE 10 CENTS PER COPY.

The Patton Pan.

Having shown in previous articles the peculiar features of the WHEELER and HORN pans, we now proceed to lay before our readers a drawing of the Patton pan, which is in some respects a compound of both, resembling rather the second than the first. The steam bottom is fastened beneath, as in the WHEELER pan, and the yoke which in the HORN pan serves for a footstep, and also carries the bearing for the horizontal driving-shaft, is here dispensed with, the footstep and shaft-bearings being set upon the wooden framing of the mill, which carries the pans. The manner of hanging the muller loose upon the driver, which is carried by a vertical shaft, and regulated in height by a screw at the top, is the same as in the HORN pan; and the attachment of the dies to the bottom, and of the shoes to the muller, by means of dovetailed tongues and sockets, is the same as in both the WHEELER and the HORN pans; but in the PATTON pan the sides, as may be seen from our illustration, are made of wood. It will be noticed that in all these pans, as manufactured by the Union Iron Works, of San Francisco, there are curved flanges extending inward from the upper part of the side. The form of these, as shown in the drawings, is slightly different in the two latter pans from what it is in the former. They are intended to affect a circulation of the pulp, and it is claimed that the warped surface, adopted in the pan herewith illustrated, does this most satisfactorily.



THE PATTON PAN.

The English Anti-Strike Movement.

It is certainly a most hopeful sign when we find a large body of workmen banded together to promote the interests of their class, boldly declaring against strikes, and in favor of settling their disputes with the employers by arbitration. Such a spectacle we have this week witnessed at Birmingham, where the National Amalgamated Ironworkers' Association, perhaps the largest and most powerful trades' union in the kingdom, has been holding its annual conference. At this assembly about 150 delegates were present, representing every grade of workers in iron in all the centers of industry in England, Scotland, and Wales.

The founder of the society, or at least one of its earliest promoters, Mr. John Kane, besides being the secretary of the union, sits as a member of the North of England Board of Arbitration of the iron trade on behalf of the men. So rapid has been the progress of the society of late, that whereas four years since it was almost entirely confined to the north of England, and comprised only 176 members, last year, when the conference met, the members had increased to 3,000, whilst now the members number 16,000 or 17,000, distributed amongst nearly 200 lodges in various parts of England.

The Chairman, Mr. Sidebottom, having briefly addressed the delegates, and counselled moderation in dealing with all things brought under their consideration, Mr. Kane, the secretary, read the report, which congratulated the members on the great advances which the society had made—as shown by the figures we have already quoted—and the fact that owing to the increase in the number of members, the monthly subscriptions had been reduced from 7d. to 4d., whereas, four years since, it was 1s. each member. It then alluded to the subject of arbitration, and stated that no principle had been adopted by the members of any trade that had done more good than arbitration and conciliation. It was admitted that discouraging and adverse circumstances had arisen, through ill-timed and hasty action in some quarters, and "by a class of people who, in open defiance of the laws of arbitration, and in direct opposition to the rules of their own Association, adopted the old and mischievous policy of throwing down their tools." This state of things, the report stated, was greatly to be deplored, as it aroused a feeling against the Association in the minds of the employers, who stated that "they must fight their disputes out with the men, because they will not act in accordance with the rules of the Association." It further stated that a basis had been laid down by the Board of Arbitration, by which the wages rose and fell in accordance with the selling price of iron in the market; and "it must not be forgotten that the men had got more frequent and better advances than they had ever got by strikes;" and that by conciliation their wages had been gradually advanced without a single child having to suffer the loss of its food. That this is the proper principle upon which to conduct trade disputes there can be no doubt; and we have no doubt there is great truth in the statement that no employer had ever been injured by arbitration, whilst tens of thousands of the men have been injured by strikes.

On the following day the subject of arbitration was again under discussion, on a question for raising a special fund to be employed in defending the interests of members in the case of strikes and lock-outs, as otherwise the men would be in a defenceless position in districts where the masters were united, and there were no arbitration boards. Mr. Kane urged that they should do all in their power to establish such boards, and in the north of England such a fund was unnecessary, as all disputes could be settled amicably.—*Mining World.*

The Eclipses of the Century.

MR. ROBERT T. PAINE communicates to the *American Journal of Science and Arts* a list of eclipses visible in the United States during the remainder of this century. The first central eclipse will be that of September 29, 1875, which will be annular in part of the State of New York and in four of the New England States. The duration of the ring on the central line will be three minutes thirty-nine seconds. At Boston it will be only two minutes twenty-nine seconds. The belt of country over which the annular eclipse will extend will be 110 miles wide. Within it are the observatories of Hamilton College, Albany, Harvard University, Amherst College, and Dartmouth College. The first total eclipse will be that of July 29, 1878, when the shadow of the moon will pass over British Columbia, Montana, Colorado, Texas, and Cuba. At Denver, Colorado, the eclipse will be total nearly three minutes.

THERE are in the Lake Superior mining district, according to Mr. SWINEFORD'S history of that region, 24 mines opened—7 of brown, 4 of specular, and 4 of brown and specular hematite, 1 of specular and magnetic, 6 magnetic, and 1 flag ore. The first opening was made in 1840, the first forge started in 1849, and the Marquette railroad was completed in 1856. There are 16 blast-furnaces and 1 rolling-mill, all charcoal and hot-blast steam but three. The rolling-mill commenced in 1868, suspended in 1869, and will recommence in June. The Lake Superior mines shipped 985,521 net tons, valued at $4,222,350 in 1870, and have produced 3,771,939 tons of iron ore, 243,450 of pig iron, and 423,849 ore and pig, valued in all at $20,060,883 since 1856.

The Paleogeography of the North American Continent.

By T. STERRY HUNT, LL.D., F.R.S.*

THE fitness of bringing before the American Geographical Society a theme which seems to belong rather to the province of the geologist, will be admitted, if we consider that geography is in fact but a branch of that comprehensive study to which we may give the name of geology, and which in its wider sense includes the whole natural history of our earth from the earliest time to our own. To the geographer belongs the study of the present condition of the globe, its oceans and lands, its mountains and rivers, its soils and climates, and its plants and animals. Past and present astronomical and meteorological agencies, and the action of internal forces, have combined to produce the results which are the object of the geographer's study. The structure and arrangement of the materials of the earth's crust, its architecture, as it were, give rise to geognosy, while the theory of the origin and development of the globe constitutes geogeny. *Geogeny*, *geognosy* and *geography* are thus three great divisions of the earth's *geology*.

To the geological student the world of modern geographers is not the only one. In the distribution, arrangement and varied nature of the rocky strata of the earth, and in the extinct races of plants and animals which they envelop, he finds authentic evidence that each past geological period has had its own geographical history. Parts of the present ocean's bed cover the ruins of a continent submerged, and our own continental areas included at times fresh-water lakes, seas with verdant islands, salt-water basins in the midst of a dry and desert land, or coastal regions swept by great marine currents, often charged with ice; and these varying conditions were in turn exchanged for "the stillness of the central sea." The record of animal and vegetable existence is traced backwards through all this varying succession until the dawn of plant life is dimly seen in the oldest known of our rocky strata, those of the Eozoic age. The student of organic fossils constructs from their history the science of *paleophytology* and *paleozoology*, and we may also, from the records of the attendant physical changes, construct what may be appropriately named *paleogeography*, or the geographical history of these ancient geological periods.

This study is one which has often engaged the attention of geologists, and maps have been made to show the distribution of land and water on the European and North American continents in various geological periods, based upon the distribution of the sedimentary rocks. Other principles may, however, serve to guide us to a further knowledge of these periods, of the rainfall and evaporation over certain areas, of ocean currents, and of the distribution of organic forms, principles which have not yet received that attention which is their due, and which may be, to some extent, illustrated on the present occasion in a sketch of certain phases in the history of the North American continent.

The period in which were deposited the various crystalline rocks of the Laurentides, the Adirondacks, and the Appalachians, offers in its greatly disturbed and contorted strata but very obscure data for its geological history. That the deposition of mechanical sediments went on under conditions not altogether like those of later periods, but still so much resembling them as to admit of the existence of both vegetable and animal life, seems clear, and justifies for them the name of Eozoic. That the long Eozoic age was marked by several breaks is also evident from the fact that in these crystalline rocks have been included three or four distinct and unconformable series, if not many more, all of which are found developed alike in the Laurentian and the Appalachian regions. Of these series, however, over great areas, only the oldest and most resisting, the Laurentian, remains.

What Prof. DANA has called the Azoic, but which may rather be called the Eozoic nucleus of the North American continent, includes portions of all of these but as defined by him, represents but a small portion of the land which in this part of the globe appeared above the ocean at the beginning of the paleozoic age, since besides the crystalline rocks of the Laurentides and the Adirondacks, must be included the similar ones of the Appalachians, which now stretch from the Gulf of St. Lawrence nearly to that of Mexico, and in their present extent represent but a small portion of a great continent since submerged, of whose former outlines we can form but an imperfect notion. Connected to the northeastward with the Laurentide region, it must have extended far into the Atlantic, and formed the eastern limit of a great paleozoic basin, the western boundary of which was the Rocky Mountains. Within the basin were deposited the sedimentary formations of the New York system, including the Cambrian, Silurian, Devonian, and carboniferous rocks. The region in the vicinity of the Adirondacks, and to the west of them, was at the commencement of the paleozoic period a great plateau, which, at one time, was but partly submerged and presented wide tidal flats, the sands of which are marked by the ancient ripple-marks, wind-marks, and tracks of the animals belonging to the time of the Potsdam sandstone.

About this period, however, great thicknesses of sediments differing widely in volume and in mineral character from those of the plateau, and in part made up of the ruins of the crystalline rocks of the eastern land, accumulated along the eastern shores of the basin. Meanwhile the plateau was, during a part of the time, above the level of the sea, and in parts cut off from the great oceanic circulation, and exposed to the influence of a very dry climate. The conditions which exist at the present day in the interior of our own and other continents, and give rise to deserts and salt lakes, were present at that early period over the great continental plateau already indicated. These conditions are dependent on mountain barriers, causing the precipitation of a great part of its moisture from the currents of air which traverse them, so that the regions beyond, with a great rate of evaporation, have a scanty rainfall, from which results the drying up of saline waters and the generation of deposits of gypsum and rock-salt; in similar conditions, as I have endeavoured to show, the magnesian limestones, which are the general associates of these, can alone be formed. The history of this great paleozoic basin affords ample evidence that between the limits of the Appalachians and the Mississippi considerable areas occupied by evaporating sea-basins existed at several periods in the paleozoic age, the first known example appearing in the Ottawa basin at the time of the deposition of the so-called calciferous sand-rock of the New York series, which is really a dolomite, enclosing in some parts gypsum, and impregnated with strong brines, which, from their great density, can be nothing else than ancient bitterns. To this local formation (followed by the Chazy) succeeded the wide-spread Trenton limestone, which, by its chemical characters, not less than its fauna, shows an open sea, and points to a movement of subsidence which disturbed the former levels and made a partial break in the paleozoic series. This is shown alike in its partial discordance with the underlying formations, the wide invasion by the Trenton sea of the adjacent land, and the noticeable break in the succession of organic life. The gradual filling up of this sea by the influx of mechanical sediments, the ruins of older rocks, apparently from the north and east, and the accumulation from this source of the Utica, Hudson River, and Oneida formations, mark the close of this order of things, and serve to divide the rocks of the second fauna, or Upper Cambrian (Lower Silurian of Murchison), from the succeeding period, or Silurian proper (Upper Silurian of Murchison).

Following this disturbance there reappeared over large areas of the continental plateau conditions similar to those of the Calciferous time, in which the marine fauna of the Clinton and Niagara formations became overlaid by the dolomites of the Salina group, which, with their interstratified gypsum and rock-salt, occurring over more than one area at this horizon, show that evaporation was carried to such an extent as to produce in Central New York and in Western Ontario great Dead Seas, whose bitter and saline waters were destitute of animal life. Over the deposits of this period and beyond them, over the Upper Cambrian rocks, which formed the eastern shore of these inland Silurian seas, the waters of the ocean again flowed, and we find in the limestones of the Lower and Upper Helderberg divisions reproduced once more the conditions of the Trenton period. The movement which permitted this must have depressed considerably the mountains of the eastern shore, and for the first time in the paleozoic period permitted the ocean's waters to invade the Appalachian hills, in which, while no evidences of earlier paleozoic deposits are met with, strata with organic remains belonging to this period (the close of the Silurian and the commencement of the Erian or Devonian) are found. These deposits, often themselves much disturbed, are met with among the valleys of Maine, New Hampshire, and Quebec, resting unconformably upon the older crystalline rocks, while they occupy similar positions upon the Upper Cambrian rocks of the Hudson and St. Lawrence valleys.

This submergence, which spread over wide areas the marine deposits of the upper Helderberg or corniferous limestone, was, like the corresponding event of the Trenton period, followed by a silting-up of the sea and the deposition of the argillaceous beds of the Hamilton formation took place, followed by the great mass of sandstones and shales of the Erie division, the so-called Devonian or the Erian series of Dawson. These sediments, which came from the northwest, and thicken rapidly in that direction, marked the commencement of that great influx of material which continued into the carboniferous time and built up on a subsiding ocean floor the great volume of later paleozoic sediments which is seen alike in Nova Scotia, and in New York and Pennsylvania. Made up of the ruins of older rocks, they show the results of the wasting and wearing down of a great area of solid land of which the Eozoic regions of New England and the British maritime provinces are the vestiges. That the shores of the sea in the Corniferous period already bore a vegetable growth is shown by the remains of ferns found by Newberry in the marine limestones of that date in Ohio. A little later, in the time of the Hamilton formation in New York there was an abundant growth of tree-ferns on its eastern shore, while further to the eastward, in Gaspé, the struggle between sea and land is shown in the presence of terrestrial vegetation in marine limestones of Lower Helderberg age.

As might be expected from the source of the land making sediments, the whole of the Erian series in Gaspé is made up of them, to the exclusion of limestones, while to the eastward the limestones of the lower part of that series, and later those of the carboniferous, are overlaid at both periods by these sediments, which, gradually encroaching upon the sea, made a soil for the vegetation of the coal. That even at this period the meteorological conditions producing great dryness recurred at times over portions of this region, is shown by the gypsum and salt deposits of the carboniferous age, which are found not only in Pennsylvania and Michigan, but far eastward in Nova Scotia and New Brunswick. It is not necessary here to recall the story of the carboniferous period, with its great development of terrestrial vegetation over low marshy plains, in which appear, for the first time, the remains of terrestrial mammals and air-breathing molluscs.

TO BE CONTINUED.

* Abstract of an address before the American Geographical Society, New York, November 12, 1872.

The Longwall System of Mining.

By J. W. HARDEN, M.E.*

CONTINUED FROM PAGE 4.

As the length of face, then, in a given case, so was the number of holers; these had generally finished their work by the time the getters and loaders came on, and with whom the daily work of the mine commenced. Beginning at the far end of his work the getter knocks out or loosens the sprags that had protected the holers, retreating of course, as he operates, when, in a seam with a free parting roof, much of the coal will "weight itself down," easily so, where a sline is cut past in the holing; where it does not do so, and in cases where gunpowder is not used, he wedges it down and breaks up the coal. With the getter, the loader commences to load the coal out of the face; this he does, laying the rails of a portable tramway as he goes along until the whole of the coal is cleared out, when the last row of props supporting the roof next the gob is removed and set so much nearer the face by the slice taken off it, and the seam is again ready for another holing. Thus, then, the whole of the coal would be taken out right across the pit's area, and the gob and water, where any, left behind; the short return air course built in the gob, and by which the far side of the pit was opened and kept ventilated, would be abandoned, there being first another built of timber and the fallings of the roof nearer to the face, and so on until all was mined out to the shaft, when, if there was yet another seam below, the shaft would be sunk to it and the process repeated.

FOWLER, in his "Papers on Mining," speaking of the difference in detail as being greater than that of any other system, says: "the principle of longwall is the same in every case, to work the coal out in long faces, and to bring the coals through roads packed through the goaf." But this is not so in respect to the gob roads. In the work just described, the coals were brought at once from the face to the hill and hauled to the shaft by the engine, the hill becoming shorter as the face advanced. An opinion, obtained in the lack of thoroughness in doing the work, and held until very lately amongst certain owners and their employés that, owing to the liability of a spontaneous ignition of the gob their coal could not be mined through gob roads, had made mining below bottom the almost universal practice in Warwickshire, until the exigencies of particular cases, such as the mining of small areas out of existing shafts, that were not worth sinking anew for, and the getting of odd acres out of corners heretofore left and lost, and increased demand, rendered necessary varied and more extended schemes of operation. Larger areas mined below bottom, divided into panels by solid ribs of coal, rendered gob roads necessary there, so that while the working face is in reality "retreating" from the dip boundary towards the shaft, there is also in the method longwall "advancing." With shaft capacity, plenty of room at bottom, and adequate engine-power, mining may be going on both above and below bottom at the same time, that is, from the dip boundary to the shaft, and from the shaft to the rise boundary, or in in a level seam "advancing" and "retreating" in the same pit.

In mining coal above bottom in a dipping seam, or longwall "advancing" in a level one, assuming a shaft to have been sunk on the solid coal, set away on each side of it a pair of parallel drifts, twenty or thirty feet apart, the distance being regulated by the thickness of the seam and depth and character of the measures over it, thurling only as often as necessary to carry air. These will be driven carefully as to their intended course; the grade necessary for economical haulage will also, with a hard floor, be that for drainage, and will incline the water to the shaft. On reaching a distance that will give the necessary width of shaft pillar, put out on the rise side the road from which the gob road is to be a continuation, and from it set away another parallel in the shape of a chamber, leaving a good pillar between it and the gangroad; this chamber will be the opening head of the longwall face.

Assuming the three parallels to be driven together and on both sides of the shaft at the same time, at sixty yards further, cross cut again for the next gob roads, and we have a bank face of that length on each side the shaft and ready for working, while the parallel drifts and chamber are continued onward. On these banks being mined far enough to the rise, so that a continuation of their face through would leave a sufficiency of shaft pillar, set away an opening chamber from each side, and on thurling, there is another bank face the length of the rise side of the pillar, the three being in line and continuous. In assigning sixty yards as the width between the gob roads, the coals being led to them half way from either side, the figure is not arbitrary. Where the roof is tolerably reliable, there will be no difficulty, in a four or five feet seam, with ordinary care, in keeping the face in constant working order with a greater distance than sixty yards, but where it is not so, and in thicker seams, the roads had better be put nearer together. According, then, to the thickness of seam and length of face will be the number of tons each road commands, which, multiplied by the number of roads, I need not say, will give the working capacity of the pit.

With the opening head made, the holing and turning out of the coal, strip by strip, across each bank is commenced and with it the building of the chocks and pack walls which are to form the gob roads and support the roof as it settles over them. For some distance from the solid rib there will be but little fall from the roof of which to build up for the setting out and support of these roads; then timber, the length and size of cord-wood, is used, built up parallel pieces crosswise on parallel pieces and filled in with gob to make them solid. A square pillar is formed battering from four feet at the base to some little less at its contact with the roof. Such pillars, well built on either side of the road, a few feet apart, become fastened and solid when the weight comes on them, and make good supports until falls of the roof provide material for the building of stone packs between them. It is well also to build stone packs twelve or fifteen feet apart immediately at the back of the props along the bank face. The falling and loose material should also be thrown together in a ridge behind them, the object being to support the broader spaces of the roof and so relieve the face and props of some of the weight, which increases on both as the work extends, as well as to prevent sudden and violent falls by receiving and letting down the roof gradually. These packs must be moved forward as the face advances, or in the case of new ones being built of fresh material they should be thrown down or they will prevent the free falling of the roof, one of the conditions most to be desired.

The building of these roads, and good packing of the gob between, is of the utmost importance, success depends upon it, more particularly where there are two or three seams to be mined as exhibited in the section given. As the working of the face retreats from the gangway and the roof lowers, it will so compress the packings that greater height in the roads will be from time to time necessary; this will be obtained either by taking up the floor, or ripping down the roof; the latter is preferable where the associating conditions do not militate against it.

The daily extension of these roads increases the cost of their maintenance and that of conveying the coal to the gang road. On the limit of economy being reached, these items of expenditure may be reduced by making a gang road across the gob roads at a point near the face and leading to one main incline to the gang road in the solid coal, in a dipping seam; or into one main horse road in a level one. This will also liberate rails and ties, and improve the ventilation by making the course of the air current shorter.

Building the packs and setting the props is done by men whose duty it is to keep the gob roads built up to the face and do similar work, and to follow the getters after the face is cleared of the coal. In setting the props where the roof is tender a "lid" (flat piece of wood) will be put between the props and the roof, but where both roof and floor is hard, they will round off the ends to prevent the burring and often splitting of the prop which would otherwise take place when the weight comes on it. It is not well to have move packs or props than is necessary along the face. These men, however, soon become good judges of the action of the roof.

Under most conditions it is best to set off a deviating road at a right angle to that from which it deviates, either when drifting in the solid or building a gob road, for the weight brought on is more uniformly sustained. But where there are planes of cleavage forming a marked feature of the roof, it is better to let the gob roads cross them obliquely; or in a coal of cubical structure the face might be worked at a right angle with it, assuming the lay of the seam not to prevent it. Occasionally under similar circumstances "buttocking" the seam will be resorted to, that is, it will be mined in a series of banks with the faces one in advance of the other. This form of work makes more cutting, therefore more slack, and it is not so easily managed in the gob.

Of the ventilation of longwall work it is not necessary to enter into detail. The manner of doing this is simple, and can hardly fail to suggest itself to the mind of every intelligent manager; generally speaking the main road will be the intake, when, if the works are not extensive, the air will be passed on to the face, in at one end and on to the other, where, by a "carving" or half gob road, that is, gob on one side and solid coal on the other, lengthening as the face recedes, the current is guided to the main return, thence to the upcast. In mines extending to divisions in the working, doors, stoppings, and regulators are necessary to divide and divert the current, avoiding doors in the working roads where possible.

In the books the advantages and disadvantages of longwall work are variously represented. One writer in his objections says that "Unless the pack walls are exceedingly strong and well built, the weight will crush them down and cause great expense in keeping the roadways." Another, in the same strain, says, "This method of working is not favorable for a tender seam having a heavy roof, as the weight on the bank crushes the coal." Another says he believes "that, where the seam exceeds *two feet nine inches* in thickness (the italics are his own) longwall is dearer than stoop-and- room; but if the seam is only two feet, it is decidedly more applicable and economical than pillar work.

Some years ago, WARRINGTON SMYTH, in one of his lectures, said of the system, "Nor is it necessary that the roof should be good, although the expense will be very different according to its fragility," and he repeats the same in a handy little book lately published. But how are we to understand it. Is not such the case with any system of mining? It is not necessary that a Cunard steamer should have fair weather to cross the Atlantic, but the certainty of its doing so, and the profits too, would be very much reduced by weather invariably foul. The roof over the coal to which the section given applies, in that respect is not a good one, beginning with three feet of soft black binds, fissile in structure, with forty-five feet of blue binds above it. Ordinary timbering was not enough. Monday morning would frequently find portions of the face covered by these binds coming down between it and the props, during the Sunday's interval, and sometimes carrying the props with it. "Saddlebacks" also, truncated oval shaped pieces four or five feet long, with a smooth surface, would not unfrequently fall and sometimes maim or kill a man. Vigilance and rapidity of mining were the secrets of its management.

But there are other conditions of badness besides that of "fragility," and there

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*A Paper read before the American Institute of Mining Engineers, at Pittsburgh, October 17, 1872.

are writers who recommend the system without qualification, one gentleman, after quoting from Mr. SMYTH'S lecture the passage alluded to, goes on to say, "In France and Belgium the system is in very general use both in small and large seams with all kinds of roof, but more particularly where the roof is bad," and recommends its adoption in the anthracite of the Wyoming Valley. He would provide the necessary gob for catching the roof by sending it down from the surface. Now, while there are no conditions to which the post and stall system can not be applied, there are some to which longwall would not be suitable, and I take it, that the discordance of levels, the heavy and unyielding nature of the roof, together with the want of uniformity in the distribution of its weight during the mining, are conditions fatal to success in the Wyoming Valley; and however desirable it might be to get those hideous heaps of wilful waste out of sight, it would not answer to send them down the pit to gob with. We have proved this in mining iron stone above bottom and coal below, when running the surplus binds down hill to be packed in the coal gob. It will not pay.

TO BE CONTINUED.

Polytechnic Branch of the American Institute.

HARBOR IMPROVEMENTS IN NEW YORK.

Mr. J. BURROWS HYDE gave an account of his design for improving the water front and the mode of freight and passenger transport along the water line, in New York. He first touched upon the remarkable fact that our mode of wharf construction was the invention of the early Dutch settlers, and has been preserved with little change, in defiance of the demands of commerce, to the present day.

The present piers are about 500 feet long and 40 feet wide, and were long enough one hundred years ago. Then four ships could easily work at a pier. Now the piers are too long for one ship, and not long enough for two. They are so narrow that a vessel at one side requires the entire width of the slip.

There is an almost stereotyped recommendation to adopt here the Liverpool, or rather the European system of closed docks, and I believe every daily paper of the city has recommended it within the past ten years. The construction of closed basins arose in Liverpool from a vast area of shallow water in front of the town, which twenty feet of tide flow left as mud banks twice a day. Walls of masonry were constructed then, more or less of the silt being excavated and the tide flow prepared the dock for ships, that were shut in by gates and protected. In London, the river Thames, a few hundred feet in width and twenty-five feet of tide, left the alternative of excavating dock-room from the shore land. Twelve hundred houses were destroyed in making room for the London and St. Katherine's docks alone. Had any European city the grand advantages of our shores and minimum tides, the costly dockage plans there would have never had existence.

In the year 1849, I submitted to some of our then city officials, plans for those improvements, but they were considered too vast and expensive, but otherwise highly commended.

In 1857, after a long absence in Europe, and a careful study of dockage and warehouse systems in England and the Continent, I concluded to again urge the adoption of my plans, which I have the pleasure for the first time to lay before the American Institute.

The monetary and political embarassment of 1857, protracted from year to year, and followed finally by civil war, prevented action until 1865, when a charter for its inauguration by a company was obtained from the Legislature at Albany.

I proposed as a condition *precedent*, that the external line of the land be fixed and locked in by a permanent wall of masonry, constructed, if necessary, in intervals, but with a view to its being ultimately one continuous line. However simple may this suggestion be considered, it was the first proposal for a bulk-head of masonry, from any source.

Second. That this bulk-head wall should be contructed at such distances outside the present line as will give to South street and West street a width of 180 to 200 feet from the sidewalk curb stone to the inside line of the bulk-head coping.

Third. That within this extended interval a large parallel receiving sewer be constructed to receive all the lateral sewers, and provided with overflows to the rivers, at long distances, and with depressed and enlarged basins or pockets at lesser distances for sedimentary matter, which can be deodorised at trifling cost, and conveniently removed, and utilized for fertilization.

Fourth. That the piers be constructed into the water way and at right angles with the bulk-head as now, but the width not to be less than 80 to 100 feet. The shortened length will not depreciate the practical working face of the present plans.

After removing the present piers and the accumulated debris and silt at the bottom, the new piers to be constructed on columns of masonry laid in cast-iron cylindrical coffer dams, sunk to the bed-rock or material of ultimate resistance; these supports so placed as to permit a free tide way beneath and through the piers, that sedimentary deposits may be easily taken out. Iron beams and girders cover the supports, with a double layer of yellow pine planking for the working surface of the pier.

Fifth. That over and upon the pier I would construct a warehouse five stories in height. The first story being a clear cart way, sixteen feet in height, the two lower floors nine feet, and the two upper ones eight feet in height. Stationary cranes fixed at intervals on the sides for unloading and loading vessels to and from the pier, cart or warehouse, with vertical hoisting ways through the floors to the pier. All those mechanisms to be worked by a steam engine constantly under steam. A powerful steam fire engine connected with every warehouse and worked by the hoisting engine, will add to the efficiency of the structure, which itself is fire-proof.

Sixth. That the widened street be divided into three uses: forty feet next the sidewalk for the usual cart traffic; forty feet next the bulk-head for carts to and from the piers, and one hundred feet between those two to be for six railroad tracks. Two outside ones for goods cars, with turn-outs to the piers so that a train of cars may be loaded with tea at San Francisco and brought directly to the ship which carries the goods to England.

The four or more passengers tracks will be free from crossing vehicles, and may run at speeds greatly increased over the present lines. It is as easy to go from Broadway to the rivers, as from the rivers to Broadway, and there must be, ere long, a general system of cross-island railways above Twenty-third street. A company was chartered by the legislature to carry out this scheme, but for various reasons it has made no progress.

MR. W. J. MCALPINE: As to the durability of cast-iron in salt water, it is supposed that iron oxidises rapidly in salt water. I have seen in Europe square piles that had been 47 years in salt water, with the weights marked on them, taken up and broken up, and no appreciable loss had taken place. Even the corners seemed sharp and distinct. Here we see water pipes decomposed; and what is the explanation? One kind of iron will decompose, and another will not. Where the carbon and the metallic iron are in intimate chemical combination, it will last 100 or 1000 years perhaps. The white or grey iron is incorruptible, while the soft foundry iron decomposes readily. I have taken up water pipes that I myself laid 30 years ago, and found them not corroded a particle. I have taken up others, which, as you took up a pipe, broke to pieces.

Occluded Hydrogen Not Alloyed.

At a late meeting of the London Chemical Society, a valuable paper upon the condition of the hydrogen occluded by palladium was read. The authors were W. CHANDLER ROBERTS and C. R. A. WRIGHT, D. Sc. It has been a question whether the gas which is absorbed or occluded does not enter into true union with the metal and form an alloy. This indeed was the conclusion to which GRAHAM came, but these experimentors have disproved the correctness of his view. Their method was to determine the specific heat of palladium, or of an alloy of palladium and gold, when charged with hydrogen by making it the negative pole in the electrolysis of acidulated water, and also of the uncharged metals. Assuming that a true alloy of the metal and hydrogen is formed, it would be easy, in accordance with KOPP'S law, to calculate the specific heat of the occluded hydrogen. Since, however, the authors find that the specific heat of the occluded hydrogen calculated in this manner varies according to the amount of hydrogen present in the charged palladium—being as low as 0·4 when the palladium is fully charged, and as high as 0·9 when it is charged with a small volume of hydrogen—they infer that the palladium does not form an alloy with the occluded hydrogen, neither can it be regarded as a mixture of a definite palladium hydride with excess of palladium, as in that case either a constant value would be found, or the variation in the specific heat would be represented by a straight line and not by a curved one. The authors are therefore inclined to believe that in palladium charged with hydrogen each several charge must be regarded as giving rise to a distinct compound, and that palladium and hydrogen are capable of entering into combination in proportions which cannot be expressed by comparing simple multiples of the combining numbers of these elements respectively, that is, by simple formulæ.

Mr. ROBERTS said they were somewhat disappointed that the results of their experiments did not favor the view that it was an alloy of hydrogen and palladium. He might state that the chief reasons why Professor GRAHAM considered the hydrogen to be alloyed with the palladium were the calculated density of the hydrogen in the charged palladium, 0·733, taken in conjunction with its unimpaired tensile strength, and its high electric conductivity. At the present time the relation between the hydrogen and palladium was very obscure, and could only be elucidated by a long series of carefully conducted experiments.

This subject is one of great importance, and though the result of this admirable investigation is negative, it may lead to the discovery of the true explanation of the phenomenon of occlusion.

In a comparative trial of the Westinghouse and Vacuum brakes on the Reading railroad, the latter brought up its train once within 70 feet less distance than its competitor and another time, in 100 feet less distance, according to the Reading *Eagle*. The brakes were applied to two trains of equal length, and the trial was made on the straight line of four miles between Reading and Leesport. The trains were run in the same direction, side by side, at a speed of thirty-five miles an hour, and the brakes were applied at a given signal. These results however must depend entirely upon the piston surface given the brake cylinders, for it is difficult to believe that equal pressures acting on equal surfaces can produce unequal work. The advantage of the vacuum system seems to lie rather in the quick release of the brakes from their bite in the wheels. In the Westinghouse brake this bite sometimes continues after the pressure is removed, and adds to the work of the engine in starting.

THE COAL TRADE.

NEW YORK, Jan. 9th, 1873.

Trade is quiet as dealers are busily engaged in closing up their yearly accounts. There is, however, a fair inquiry, and it is expected that business will somewhat revive with the month of February, though not to any extent before. There is some uneasiness as to the future condition of the labor question in the coal field. The dispute in the Schuylkill region is not yet settled, and there is some apprehension that the difficulty may spread into the other districts. That, however, is a problem about which it is useless to speculate, and the time to discuss it will be when troubles present themselves.

There is a good deal of discussion about the Reading Railroad pool, and extravagant stories of what the road has done and proposes to do have made their appearance in the daily press. One of our contemporaries says that the Reading Coal and Iron Company, (which as our readers know is practically the coal selling department of the Reading road) has spent sixty millions in buying up Schuylkill collieries, "and consequently owns or has a dominant interest over mines producing 2,700,000 tons per annum." The fact of the matter according to statements of those who are at headquarters is this: Mr. GOWAN being desirous to increase the business of his road, made a proposition to the Schuylkill producers to cash all their coal for them on a given day of the month—the 15th we believe—for a commission of 10 cents a ton, the dealers to receive the average price of the sales. Inasmuch as there are forty or more operators in Schuylkill coals in Philadelphia, there were quite a number of malcontents, and the proposition was rejected by the producers of one-half or more than one-half the coal. The red ash mines are entirely, or nearly so, out of the pool, but we believe a majority of the white ash coals will be sold through the road.

Of course there is a good deal of feeling in regard to this step of Mr. GOWAN. The Reading road is all powerful in the Schuylkill region, and whatever its obligations as a common carrier may be, every one knows that it can make the position of any opposing mine owner very disagreeable, and still keep within its legal requirements. The relations of a road to the producers of bulky articles are so intimate, that business cannot be carried on unless good feeling and perfect justice prevail. There have been rumors that the coal operators were threatened with serious difficulties in case they did not come into the pool.

But we are informed that Mr. GOWAN distinctly informed them that if any proprietor did not accept his proposal, he would enjoy precisely the same transportation facilities he has now. Certainly we cannot understand that any oppressive course would benefit the road in the long run, and we are assured that none has been attempted or contemplated. Under these circumstances the stories about a combination in Philadelphia to enter legal proceedings against the road, would seem to be unfounded. Legal proceedings will be baseless unless it can be shown that the road discriminates between its patrons; and that they have the word of Mr. GOWAN shall not be done.

The men affected are the middlemen. The Reading Road is to receive 10 cents a ton on a production of about two million tons, that being about the prospective amount of its new sales. Is this 10 cents to come out of the middlemen or the consumer? The former are evidently afraid that they will be at least partial sufferers. However that may be, the result of the arrangement will undoubtedly be an effort to increase the price of coal, and there can be little doubt that the company holds power enough to effect this advance. It cannot be denied that a certain advance would be perfectly legitimate, for coal has been selling at rates that cannot sustain the business, if long continued. If an advance is to come it may as well come through the Reading pool as any way, provided it is not carried too far; and against that contingency, this country, in our opinion, offers sufficient safe-guards. We are sorry to learn, however, that some operators take so desponding a view of the future as to give up all hope of business, and one has really thrown up the lease of his office.

As we have said, the pool controls about 2,700,000 tons of coal, and there are somewhat more that 3,200,000 tons of outside coal. A large part of this is absorbed by the line trade so that the road really controls the bulk of the through trade. The arrangement is not yet fully completed but will be in about a week. Mr. E. A. Quintard is the New York agent of the pool, and we believe resigns his other occupations to give this his sole attention.

In the bituminous trade matters are also quiet with a fair enquiry. The price in New York is $7 50. Gas coals are coming forward in limited quantities but are all absorbed by existing contracts, so that there is no coal offering in the market. The amount of coal imported during 1872 is less than usual, and it will be still less during the coming year. Liverpool gas coal is selling at $18, while our own gas coals bring only $9. Pennsylvania cannel coal is also replacing the English, the import for 1872 amounting to only two-thirds of that for 1871.

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending January 4, 1873, compared with the week ending Jan. 6, 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
*Phila & Reading R.R†..	20,068	270,040	30,506	315,818
*Schuylkill Canal	....	13,356	....	6,594
*Lehigh Valley R. R.	47,553	281,629	35,216	209,868
Lehigh & Sus. R. R.	16,690	16,690	12,440	12,440
Lehigh Canal	....	....	....	....
Scranton North	10,296	10,296	6,585	6,585
" South	38,196	38,196	16,931	16,931
Penn. Coal Co., rail	13,027	13,027	7,778	7,778
" " " canal	....	....	....	....
Del. & Hud. Canal Co.	....	....	....	....
" " East	10,646	10,646	5,624	5,624
" " West	15,312	15,312	3,682	3,682
" " South	6,003	6,003	2,257	2,257
Shamokin	2,377	2,377	3,685	3,685
Trevorton	....	.....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	.....	....	....
Wyoming South	....	.....	....	....
P. N. Y. C. & R. R. Co.	....	....	8,891	47,799
Williamstown Col'y	....	....	....	....
Big Lick Col	....	....	....	....
Total	180,168	677,572	133,575	639,081
1870	133,595	639,081		
Increase	....			
Decrease	46,573	38,491		

* These figures are for the week and fiscal period commencing Nov. 30.
† Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Dec. 28, 1872, compared with week ending Dec. 30, 1871.

COMPANIES.	1871. Week.	1871. Year.	1872. Week.	1872. Year.
C. & O. Canal	..	....	....	....
B. & O. R. R.	....	....	....	....
Penn. S. Line	....	.....	....	....
H. & B. T. R. R.	....	....	....	....
*Harrisburg & D.	....	....	....	....
*L. V. R. R.	....	....	....	....
P. & N.Y.C. & R. Co.	....	.....	....	....
Cumberl'd Branch Canal	....	....	....	....
" Railroad	....	....	....	....
Total				
Decrease				
Increase				

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending January 4, 1872.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received:		
From Lehigh Valley R. R.	5,670 00	27,269 17
" Lack. & B. R. R.	687 05	3,830 09
" Pleasant Valley R. R.	2,506 12	13,230 12
" Sul. & Erie R. R.	27 05	3,468 07
Total	8,891 02	47,799 05
Same time last year	7,660 17	45,177 07
Increase		2,621 18
Decrease	1,230 05	
Distributed:		
To Lehigh Valley R. R.	907 15	4,984 11
To Lack. & B. R. R.	4 19	141 18
To S. Central R. R.	1,151 19	10,005 17
To Ithaca & A. R. R.	1,298 18	6,982 13
To Erie R. W. Pockets for shipm't.	3,199 08	13,878 01
To individuals on line of road	849 13	4,891 15
To points at & above Coxton for use of Co.	391 15	2,294 01
To points between Waverley and Elmira	1,086 15	5,620 09
Total	8,891 02	47,799 05
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda	4 655 02	23,596 11
Shipped south from Towanda	12 00	141 11
Northern Central R. R.	....	
Total	4,677 02	23,738 05
Same time last year	5,931 14	28,595 16
Increase		
Decrease	914 02	4,857 11
Distributed:		
To Erie Railway	3,767 11	19,701 07
To So. Central R. R.	867 11	3 860 10
To Ithaca Valley R. R.	....	111 04
Lehigh Valley, R. R.	30 00	30 04
To individuals on line of Railroad.	12 00	35 04
To points on line of road for use of Company	.....	
Total	4,677 02	23,738 05
Grand totals transported:		
Anthracite	8,891 02	47,799 05
Bituminous	4,677 02	23,738 05
Total	13,568 04	71,537 10
Same time last year	13,252 01	73,773 03
Increase	.....	
Decrease	316 03	2,235 13

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Jan. 4, 1872.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	12,069 17
" Port Carbon	1,335 06
" Pottsville	723 14
" Schuylkill Haven	1,696 10
" Pine Grove	364 12
" Tamaqua	3,971 09
" Harrisburg	
" Dauphin	164 03
Total	20,227 10

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	
" Mill Creek "	
" Schuylkill Valley Scales	
" Mt. Carbon "	
" Cressona "	
" Pine Grove "	
" Tamaqua "	
Total	

SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.

Via Catawissa & Williamsport Br.	339 00
" N. C. R. R. passing Locust Gap	590 04
" " " Shamokin	3,637 12
" " " Herndon	....
Total	4,566 16

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	300 03
" Lebanon & Pine Grove Branch	10 16
Total	311 02

CONSUMED ON LATERALS.

From Frackville Scales	391 12
" Mill Creek "	403 13
" Schuylkill Valley Scales	716 05
" Mt. Carbon "	709 03
" Cressona "	364 02
" Pine Grove "	106 03
" Tamaqua "	372 17
Total	3,089 04

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East Cat. & Wpt. Br.	2,089 17
" " Rupert, Cat. & Wpt. Br.	17 14
" " Allentown, E. Penn's Br.	17 08
" " Alburtis, " "	....
" " Oreland, G. & N. Br.	126 00
" " Connecting R. R.	.....
" " Willow Street R. R.	79 00
Total	2,329 19

BITUMINOUS.

From Harrisburg	3,593 02
" Connecting R. R., G. & N. Br.	
" Junction R. R.	80 00
Total	3,563 02

COAL FOR COMPANY'S USE.

Anthracite	5,019 15
Bituminous	67 02
Total	5,086 17

RECAPITULATION.

	Total for Week.	Corresp'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	20,727 10	16,264 03	i 3,963 07
For Shipment by Canal			
Shipped Westward via Northern Central R. R.	4,566 16	911 06	i 3,655 10
Shipped West or South from Pine Grove	311 02	202 06	i 108 16
Consumed on Laterals	3,089 04	1,712 04	i 1,377 00
Lehigh and Wyoming Coal	2,329 19	987 07	i 1,333 12
Total Anthracite paying freig't	30,506 11	20,068 06	i 10,438 05
Bituminous	3,553 02	8,546 11	d 4,993 09
Total of all kinds paying freig't	34,059 13	28,614 17	i 5,444 16
Coal for Company's use	5,086 17	3,981 09	i 1,105 08
Total Tonnage for Week	39,146 10	32,596 06	i 6,550 04
Previously this year	335,303 09	353,165 02	d 17,861 13
Total to date	374,449 19	385,761 08	d 11,311 09
SHIPPED BY CANAL.			
From Schuylkill Haven			
" Port Clinton			
Total Tonnage per Week	6,594 00	13,358 16	d 6,761 16
Previously this year			
Total to date	6,594 00	13,355 19	d 6,761 16

Lehigh Coal and Navigation Company.

Report of Coal transported over the Lehigh Canal and L. & S. Div of Central Railroad of New Jersey for the week ending Jan. 4, 1872, and for the year 1872.

	WEEK.	YEAR.
Forwarded East of M'ch Chunk by Rail	12,439 19	
Delivered at and above do., ...	832 18	
Forwarded East of do., by Canal	.....	
	13,272 17	
Corresponding period last year—		
Forwarded East of M. Chunk by Rail..	16,690 00	
Delivered at and above do., ..	1,338 01	
Forwarded East of do., by Canal	.....	
	18,028 01	
Increase on Railroad	.....	
Decrease " "	4,755 04	
Increase on Canal	.....	
Decrease " "		
Of the above there was transported on account of—		
Lehigh Coal Nav. Co	3,463 00	
Wilkesbarre Coal & Iron Co.	5,641 07	
	9,104 07	
Corresponding period last year—		
Lehigh Coal & Nav. Co	6,142 07	
Wilkesbarre Coal & Iron Co.	6,076 18	
	12,219 05	
Increase	.....	
Decrease	3,114 18	.....

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Jan. 4, 1872, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	8,847 10	48,732 07
" Hazleton	23,061 09	125,843 03
" Upper Lehigh	70 19	343 12
" Beaver Meadow	8,676 17	47,107 08
" Mahanoy	2,030 06	28,327 12
" Mauch Chunk	21 12	88 10
Total	42,708 13	250,442 12
Same time last year	52,825 08	317,448 00
Increase		
Decrease	10,146 15	67,005 08
Forwarded East from Mauch Chunk by rail	35,216 00	209,866 09
Same time last year	47,563 10	281,629 02
Increase		
Decrease	12,337 10	71,740 13

DISTRIBUTED AS FOLLOWS.

Forwarded East from Mauch Chunk by rail	34,197 16	205,763 17
do East for use L. V. R. R.	1,008 04	4,124 12
Delivered at and above Mauch Chunk for use of L. V. R. R.	852 08	5,793 18
To P. & N. Y. R. R.	5,670 00	27,269 17
To L. C. R. R. at Mount Carmel		959 19
To S. H. & W. R. R.	487 10	1,981 02
To L. & S. R. R. at Packerton for rail		1,020 01
Delivered at M'h Chunk	133 09	336 08
Delivered on line of road above Mauch Chunk	99 01	
To L. S. & R. R., at Penn Hav., for railroad	270 05	1,656 08
Do. for canal		1,519 10
To Lehigh Canal Mauch Chunk		
To Catawissa Railroad	10 00	15 00
Total	42,708 13	250,442 12

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, Jan. 4, 1872.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	6,585 01	846,107 07
Shipped South	16,931 01	1,994,478 01
Total	23,516 02	2,840,585 18
For the Corresponding time last Year:		
Shipped North		559,973 10
Shipped South		1,356,513 02
Total		1,916,486 12
Increase		924,098 16
Decrease		

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending January 4—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872., tons ct.	WEEK 1871. tons ct.	YEAR 1872 tons cwt.	YEAR 1871. tons. cwt.
Wyoming Region	1806 17		1497303 13	1297560 14
Upper Lehigh Region	1785 18		205018 02	111756 07
Hazleton Region			241701 04	217116 19
Beaver Meadow Region	374 03		168093 15	83665 10
Mauch Chunk Region	557 00		414951 18	247192 12
Tresckow Region				
Mahanoy Region				
Totals	4522 18		2527068 12	1957294 02
Increase	4522 18		569774 10	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	2449 07		1727611 09	1231054 17
Forwarded East of Mch Chunk by Canal			487628 16	420246 15
Delivered at and above Mauch Chunk	361 17		63923 15	70901 06
L. V. R. R. at Packer'n	65 05		15500 18	23856 04
Delivered to L. & B. R. R. at Plymouth Bridge	1656 09		232103 12	106236 02
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co	592 18		640206 19	358244 11
W.-B. C. & I. Co	139 10		974853 15	861128 17
Totals	706 10		1615060 14	1226373 08
Increase	706 08		388687 06	
Decrease				

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, January 4, 1873.

	WEEK.	SEASON
North	16,110 04	16,110 04
South	2,257 06	2,257 06
Total 1873	18,367 10	18,367 10
Corresponding time in 1872:		
North	31,830 05	34,830 05
South	6,003 07	6,003 07
Total	40,833 12	40,833 12
Increase North		
Decrease North		
Increase South		
Decrease South		
Total increase 1872	22,466 02	22,466 02
Decrease		

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 4 days ending January 4, 1873.

	Tons. Cwt.
East	
West	3,684 14
Same time last year	2,376 14
Increase	1,308 00
Decrease	
Total amount shipped to date	3,684 14
Same time last year	2,376 14
Increase	1,308 00
Decrease	

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the 5 days ending Tuesday Dec 31. and during the year 1872, compared with the corresponding period of 1871,

WEEK.

	C. & O. C'l. Tons. Cwt	B. & O. R. R. Tons. Cwt.	Pa. S. Line Tons, Cwt.	Total. Tons. Cwt.
1872	—	21,196 08	1,919 11	23,115 17
1871	—	17,617 00	....	17,617 00
Increase	.....	3,579 08	1,919 11	5,498 17
Decrease	—	.....	....	

YEAR.

1872	612,536 18	1,256,277 01	21,791 01	1,890,605 00
1871	653,420 02	1,231,241 00	....	1,884,641 02
Increase	....	25,036 01	21,791 01	5,963 18
Decrease	40,883 04	....	....	....

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co. Tons. Cwt.	Total. Tons. Cwt.
1872	—		
1871	—	302 05	302 05
Increase	—	.....	.....
Decrease	.....	302 05	302 05

YEAR.

1872	203,617 16	26,069 16	229,687 12
1871	194,253 07	71,490 16	265,744 03
Increase	9,364 09		
Decrease		45,421 00	36,056 11

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending January 4, 1872.

	1873. WEEK.	1873. YEAR.	1872. WEEK.	1872. YEAR.
By Railway	7,778 08	7,778 08	13,026 12	13,026 12
" Canal	....	....	....	....
Total				
Increase 1873	5,248 04			

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, January 4, 1872.

	WEEK.	SEASON.
By Delaware and Hudson Canal	....	1,294,041
By Railroad, East	2,877	549,414
" West	1,684	432,756
" South	1,100	379,416
Total 1872	5,661	2,755,627
Corresponding time in 1871:		
By Delaware and Hudson Canal	....	991,825
By Railroad, East	9,734	352,043
" West	1,213	114,763
" South	4,259	335,847
Total	15,206	1,794,478
Increase	961,149	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK. January 10. R. A.	W. A.	AT PHILADELPHIA January 10. R. A.	W. A.
SCHUYLKILL.				
Lump	$ —	$ —	— —	
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	
Egg	— —	— —	— —	— —
Stove	— —	— —	— —	— —
Chestnut	— —	— —	— —	— —
Pea	— —	— —	— —	— —
LEHIGH				
Freight to New York 50 cents.				
Lump, (on board)	— —	5 00	— —	— —
Broken	— —	4 75	— —	— —
Egg	— —	4 75	— —	— —
Stove	— —	5 10	— —	— —
Chestnut	— —	4 15	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.				
Honey Brook, Le'h W. A.	4 15@5 10		— —	— —
Spring Mountain " "	— —@— —		— —	— —
Sugar Creek " "	— —@— —		— —	— —
Sugar Loaf " "	— —@— —		— —	— —
Old Compy's " "	4 15@5 10		— —	— —
Room Run " "	4 15@5 10		— —	— —
McNeal " "	— —		— —	— —
Girardville " "	— —		3 10@4 00	— —
Hill & Harris " "	— —		— —	— —
Shamokin " "	— —		— —	— —
Lykens Valley " "	— —		— —	— —
Broad Top " "	— —		3 25@4 25	— —
McMichael " "	— —		— —	— —
Henry Clay " "	— —		— —	— —

Company Coals.

January, 1873.

	L.	Str.	Grs.	Eg.	Sto.	Chest
*Scranton at E. Port	4 00	3 95	4 10	4 40	5 00	3 90
*Pittston at Weehawken	4 75	4 25	4 40	4 40	4 90	4 25
*Lackawana at Weehawken	4 20	4 30	4 40	4 65	5 10	4 30
Wilk'b're at Hoboken	4 00	4 20	4 40	4 50	5 00	4 00
Old Co. Lehigh at Pt. John'n	5 25	—	4 85	4 90	5 15	4 15
Lehigh at Eliz. Port	5 00	—	4 75	4 75	5 10	4 15

For freights to different points see "Freights To contractors only.

Prices at Baltimore—January, 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 35@5 60
Pittston and Plymouth, do	5 25@5 50
Shamokin Red or White Ash, do	5 50@5 75
Lykens Valley Red Ash, do	6 25@6 50
Zerba Valley	
Treverton	
By retail, all kinds per ton of 2,240 lbs	7 25@7 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	@4 75
Fairmont and Clarksburg gas f. o. b. at L. Point	6 00

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	4 75
Consolidation Coal Co.'s on board at Baltimore	4 75
Maryland Coal Co " "	4 75

Prices at Georgetown, D.C., and Alexandria, Va.

January, 1873.

George's Creek and Cumberland f. o. b. for shipping $4 37@4 50 [nominally.

No coal before spring.

Prices at Havre de Grace, Md.

January, 1873

Wilkesbarre and other White Ash for Cargoes	$ @4 75
Lykens Valley	@5 75
Shamokin Red or White Ash	5 00

Bituminous Coals (Cumberland).

Georgetown, F.o.b	$
Baltimore "	4.75
New York "	7.50

Prices of Foreign Coals.

January, 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	Nominal.
" Cannel	15 00@16 50
" House "	22 00@23 00
" Orrel	17 00@18 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$20 00@22 00
"Cannel, "	23 00@25 00

Per ton 2,000 lbs. delivered.

Prices of Gas Coals.

January, 1873.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Coarse	Slack.
Block House	$2 00	$1 00
Gowrie	1 75	— 80

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal,
Pictou nett	$2 25	1 25
Sydney	2 25	- 60
Langan	1 75	- 50
Caledonia	1 75	- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.	Nominal quo. Currency.
Westmoreland	$7 10 @ — —
Fairmount Gas Coal Co. of N. Y	7 00 @ — —
Despard Coal Co	7 00 @ — —
Penn	7 10 @ — —
Newburg Orrel Gas	— — @ — —
West Fairmount Gas Coal	7 00 @ — —
Redbank Cannel, Penn	— — @ — —
AT PHILADELPHIA.	
Westmoreland	7 00 @ —

Freights.—January, 1873.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore	Anthracite. From Philade'a.	Anthracite. From Elis. Port, Port Johnston, and Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout.
Amesbury						
Bangor				3 00		
Bath		4 25				
Boston	3 10	4 25	3 00	3 00		
Bridgeport	2 75	3 25	1 00	1 00		
Bristol			1 75	1 50		
Cohasset Narrows	2 25		1 25			
Derby			ice	1 25		
Dighton	2 85		3 10			
East Cambridge			3 15	3 20		
Fall River	2 75	3 25	1 75	1 50		
Hackensack						
Hartford		3 .5	ice	ice		
Hoboken	2 10		50	50		
Jersey City	2 10			50		
Lynn			1 35			
Middletown			ice	ice		
Mystic			3 45	1 40		
New Bedford	3 00	3 25	1 75	1 50		
Newburyport	3 10	4 25	3 25	3 25		
New Haven	2 75	3 25	1 00	1 00		
New London	2 75	3 25	1 35	1 25		
Newport	2 30		1 75	1 50		
New York	2 25	3 00	50	50		
Norwalk	2 50	2 75	1 00	1 00		
Norwich			ice	ice		
Pawtucket			ice	ice		
Portland	3 25	4 25	2 70	2 70		
Portsmouth, N.H		4 25	3 15	3 20		
Prov.dence	2 75	3 25	3 75	1 80		
Rockport			1 35			
Saco			3 00			
Sag Harbor			1 35	1 35		
Salem	2 70	4 25	2 00	3 00		
Stamford			1 00	1 00		
Stonington			1 40	1 35		
Taunton			ice	2 00		
Warren			1 75	1 50		
TO RIVER PORTS						
Albany						
Catskill						
Cocksackie						
Coeyman's						
Cold Spring	2 30					
Fishkill						
Haverstraw						
Hudson	3 25					
New York						
Nyack	2 25					
Poughkeepsie	2 50					
Rhinebeck						
Rondout						
Saugerties						
Sing Sing						
Stuyvesant						
Tarrytown						
Troy	3 00					
West Point						
Yonkers						

St. Thomas	$5 00 Gold.
Martinique	5 00 "
Demerara	6 00 "
New Orleans	6 00 "
Mobile	6 00 "

Foreign and Provincial Freights.

January, 1873.

Foreign.
Newcastle and Ports on Tyne, per keel of 21 1-5 tons £1
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial.	
Sydney	$3 05
Lingan	3 50
Cow Bay	3 75
Port Caledonia	3 10
Little Glace Bay	3 00

TO BOSTON.

Sydney	3 00
Lingan	3 00
Cow Bay	3 00
Port Caledonia	3 00
Little Glace Bay	2 90

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75 Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	1 06
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23

MAUCH CHUNK TO PORT JOHNSTON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	72
B. & D. R. R. / Cam. & Am. R. R.	1 06
Shipping Expenses	25
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. & R. Penn Haven to Phillipsburgh	0 84
C. R.R. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 25

MARKET REVIEW.

NEW YORK, Jan. 9, 1873.

Iron—The market for Scotch Pig is very dull, the only inquiry being from speculators, who now hold the bulk of the stock here. The consumptive demand is very light, and in absence of business, quotations are somewhat nominal; we hear of no sales. American Pig has been more active, and with considerable sales, as noted below, producers show no disposition to make further contracts for delivery ahead; we understand that $45 has been offered and refused for further lots of 1000 tons. There is a stronger feeling, and without more inquiry from consumers, prices are perhaps a shade firmer, though no advance has yet been made. The sales are 25,000 tons Glendon Forge at $40, for delivery during this year; and several thousand tons Allentown and Crane, at $45 for No. 1, and $44 for No. 2, with same prices for Philadelphia delivery. New English Rails are steady and firm at $73a75 gold, and old are decidedly firmer, a lot of 300 tons having been sold at $55 currency, while holders generally are asking $57,50 for D. H. and upward. Scrap is very quiet, the almost entire absence of business in this article makes it difficult to give reliable figures; we quote from yard $48a50, and from dock $40a45, with a sale of 150 tons mixed Wrought and Cast, from ship, on terms not made public. Refined Bar from store is quiet, but strong at our quotations.

A late Liverpool paper says:—Wolverhampton letters say there is somewhat more firmness in the Iron trade of that district than reported a week ago. Quotations are decidedly stronger, both for pig and finished iron; but, as a rule, makers are unwilling to enter into long contracts even at current rates.

LEAD—There has been more business, and there is an improved feeling, though prices are without quotable change; the sales embrace 200 tons Spanish at $6,37½, $6,45, and $6,50 gold. Bar 9¼ cents, Sheet and Pipe 10½, and Tin-Pipe 16½, usual discount to the Trade.

COPPER—Manufacturers have as yet made no changes in their goods, and we quote as above—New Sheathing 43 cents, and Bolts and Braziers 45; Bronze and Yellow Sheathing 27, and Y. M. Bolts 32, net cash. The market for Ingot continues excited and unsettled by the further receipt of cables, advising rapidly advancing prices in England. Yesterday morning telegrams came to hand noting an aditional advance of £4, and in the afternoon a further rise of £1, making £5 since our last. Prices here may be quoted about half a cent per lb. higher. Sales have been made of 50,000 lbs. Lake at 34 cents, cash; 200,000 lbs. Baltimore, 33; 300,000 lbs. Lake, for January to March delivery, 35; and 170 tons English Best Selected, 30a30½, cash and 30 days.

SPELTER—There has been no business, and prices are nominally as before, say 6¾a6¾ cents gold for Silesian.

STEEL—The market continues steady and firm at old figures.

TIN—Pig is quiet but steady, with sales of 2a300 slabs Straits at 31a31½ cents; and about five tons English, 31¾ generally held at 31¾a32; Banca 36½ all gold. As fore, shadowed for some time past, the market for Plates has advanced, the rise being assisted by the receipt of telegrams from Liverpool quoting prices for I. C. Charcoal up to 43s. There has been considerable business for future delivery, the sales embracing 8000 bxs. Coke Tin at $7,25a$10, closing at the latter price for ordinary brands; 750 do. ordinary Charcoal Terne, $10; and 500 do. good, $10,25, all gold, both the latter parcels for January delivery. We revise our quotations for all kinds.

ZINC—We note a sale of 100 casks Mosselmann Sheet from agents' hands, at 9½ cents, less 4 per cent., gold.

EDWARD SAMUEL under date of PHILADELPHIA, Jan. 8, 1873, says: In Pig Iron for the past week the market has been fairly active with sales aggregating 12 to 15,000 tons at about $44a45 for No. 1, $43 for No. 2, and $39a40 for Gray Forge. Lehigh brands of Scotch Pig is held more firmly, but is dull. There is more inquiry for old rails, and holders ask $49 to $50 gold. Wrought Scrap is about the same, Manufactured Iron is in better demand with considerable inquiry.

Below are the highest and lowest quotations for different makes:

American No. 1 Foundry Pig, at Furnace, 44a45; do. No. 2, at $42a43; do. No. 3, Forge, do., $35a39; No. 4 White and Mottled, do. 30a32; Scotch Pig, (Cargo lots, for shipment,) 47a48; Old Rails, DHs, (for shipment here,) $49a50 gold; do. (on the spot and for arrival,) 48a40, do.; No. 1, Wrought Scrap, (ex. ship,) 45a46 Currency; do. (for shipment here,) 46a47; American Refined Bar, (mill price,) 4½ cents; do. Common, do., $37.50a90; Rails, (at mill,) $82a84; English Rails (ex. ship, N. Y.,) $72½a74, Gold.

METALS.

NEW YORK, January 9, 1873.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

	Store Prices.
Pig, Scotch—Coltness ℔ ton	@55 00
Gartsherrie	53 00@54 00
Glengarnock	50 00@51 00
Eglinton	@48 00
Pig, American, No. 1	45 00@00 00
Pig, American, No. 2	43 00@44 00
Pig, American, Forge	38 00@40 00
Bar Refined, English and American	— —@110 00
Bar Swedes, assorted sizes (gold	120 00@130 00

	Store Prices, Cash.
Bar, Swedes, 1⅜ to 5 x ⅜ & ⅞ 2 sq. & 6 to 12 x ⅜ & ½	145 00@155 00
Bar, Refined, ⅝ to 2 in. rd. & sq. 1 to 6 in. x ⅜ to 1 in.	105 00@107 50
Bar, Refined, 1¼ to 6 by ¼	110 00@112 50
Bar, Refined, 2⅛ to 2⅞ round 1 & 1⅛ by ¼ & 5/16	112 50@115 00
Large Rounds	112 50@125 00
Scroll	120 00@150 00
Ovals and half-round	130 00@150 00
Band	— —@122 50
Horse Shoe	117 00@127 50
Rods, ⅝ to 2-16 inch	110 00@152 50
Hoop	127 50@172 50
Nail rod	@ 9
Sheet, Russia, as to assortment (gold)	16 @ 16¼
Sheet, Singles, D. and T. Common	—6½@— 7½
Sheet, D. and T. Charcoal	—7¼@— 8½
Sheet, Galv'd, list 10 per cent, discount	—@ — —
Rails, English (gold), ℔ ton	73 00@ 75 00
Rails, American, at Works in Pennsylvania, currency	80 00@ 00 00

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 43
Copper Bolts	— @— 45
Copper Braziers, 16oz. and over	— @— 45
Copper Nails	— @— 45
Copper, Old Sheathing, &c. mixed lots	28 @— 30
Copper, Old, for chemical purposes, 14@16 oz.	— @— —
Copper, American Ingot	— @— 34
Copper English Pig	30 @— 30½
Yellow Metal, New Sheathing & Bronze	27 @— 00
Yellow Metal Bolts	— @— 32
Yellow Metal Nails	27 @— 30

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 11½ cents ℔ lb; Pipe and Sheet, 2¼ cents ℔ lb.

Galena, ℔ 100 lbs.	$— @—
Spanish (gold)	6 37½@6 62½
German, do.	6 37½@6 62½
English do.	6 50 @7 00
Bar (net)	9 25 @ —
Pipe (net)	— — @10 50
Sheet	— — @10 50

Colwell, Shaw & Willard Tin-Lined Lead Pipe 16½ cts. ℔ lb.

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.

English Cast (2d and 1st quality) ℔ lb	— 18 @— 22
English Spring (2d and 1st quality)	— 9½@— 10½
English Blister (2d and 1st quality)	— 11½@— 16
English Machinery	— 11½@— 14
English German (2d an 1st quality)	— 11½@— 12
American Blister "Black Diamond"	— — @— 11½
American, Cast, Tool do.	— — @— 17
American, Spring, do.	— — @— 11
American Machinery do.	— — @— 11½
American German, do	— 9 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	36½@—
Straits	31 @31½
English	31¾@32

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$11 00 @11 50	$12 75 @13 25
I. C. Coke	10 00 @10 25	11 50 @11 75
Coke Terne	8 50 @ 9 00	9 75 @10 25
Charcoal Terne	10 00 @10 25	11 50 @11 75

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 bl

Plates, Foreign (gold) p. 100 lb.	6 62½@ 6 87½
Plates, Domestic p. lb.	8¾@— 10¾

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c. per Sheet per lb.—10 @10½

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, Jan. 9, 1872.

Without exception the San Francisco Stock List has slightly advanced as per the following advices, dated San Francisco, Jan. 7th. Kentuck is inactive, no sales of which has occurred since our last.

		Jan. 9.
Savage	—	93
Crown Point	—	93
Yellow Jacket	—	76
Kentuck	—	—
Ohollar Potosi	—	59
Gould & Curry	—	182
Belcher "New Issue"	—	93
Imperial	—	9
Raymond & Ely	—	88
Meadow Valley	—	16

MISCELLANEOUS.

R. P. ROTHWELL,
MINING AND CIVIL ENGINEER,
ROOMS 90, 91,
71 Broadway, N. Y., and Wilkesbarre, Pa.
Reports on the value of mineral property—advises on the working and management of mines—makes detailed plans and estimates for mining improvements and appraisements of the value of mines, mining machinery &c., and gives information as to the value of mining stocks &c., as investments.
P. O. Box 2487, N.Y.

ALX. TRIPPEL, C. E., MINING ENGINEER AND METALLURGIST.
ISIDOR WALZ, Ph. D. ANALYTICAL AND CONSULTING CHEMIST.
No. 18 EXCHANGE PLACE, NEW YORK.

W. B. COGSWELL,
Civil & Mechanical Engineer.
SPECIALITY:
Blast Furnace Construction.
P. O. Address
Franklin Iron Works,
Oneida County, N. Y.
Nov. 19:1y

JOHN J. ENDRES,
Mining and Civil Engineer,
MANUFACTURER OF MACHINERY FOR MINING AND SMELTING PURPOSES.
SPECIALITY:
Patent Ore and Coal Crushing and Washing Machines.
BUILDER OF IMPROVED COKE OVENS AND MACHINERY FOR DISCHARGING THE SAME.
Office and Works:
SOUTH PITTSBURGH, PA.
Nov. 26:3m

P. H. VAN DER WEYDE, M. D.,
(Late Professor of the N. Y. Medical College, Mechanics, etc., at the Cooper Institute, and of Industrial Science at the Girard College, Philadelphia.)
Analytical & Consulting Chemist and Engineer
236 Duffield street, Brooklyn.
Office MANUFACTURER AND BUILDER, 37 Park Row, New York City.

A New Through Route.

The opening of the Chesapeake and Ohio Railroad, which was to take place in the first week of the year, but has been a little delayed by some of those difficulties which are so apt to upset the calculations of engineers, will be an event of great consequence, not only to the South, but to every part of the country. Those who are conversant with the condition of trade in the West know that the lack of transportation facilities is one of the principal difficulties with which the western producer has to contend. Many an iron furnace, that has every reason, in a good demand and high prices, to look for brilliant success, is crippled for want of cars to supply it with ore and fuel, and to carry off its product. The cause of this evil is the necessity under which the roads lie of providing for the through traffic, and the distance of the ports to which that through traffic is bound. The cars are long in making the round trip, and the roads have not capital enough to provide a full supply of cars for the way trade. The Chesapeake and Ohio, by providing a short through route between the West and the East, will be able to do a great deal in relieving the older roads from this excessive pressure. Its junction with the river system of the Mississippi valley is made at a point which is to a great extent relieved from the drawbacks which beset the navigation of the rivers during a large portion of the year. Coal can be floated from Huntington, its terminus on the Ohio, for a considerably larger part of the year than from Pittsburgh; and the condition of the coal supply in the western cities during the past season is reason enough for saying that the new opportunities will be largely made use of. Indeed, Cincinnati has already moved in this direction, and a project for exploiting the Coal River district in West Virginia, for the benefit of that city, met with hearty support.

The next ten years are destined to witness a wonderful increase in the iron business, and, indeed, in general metallurgical and industrial activity in the West. Metallurgical coal is a rare article in that region, and the great Connellsville bed is the main dependence of most of the coke burning furnaces of the Mississippi valley. The opening of the West Virginia coal beds will undoubtedly relieve the western consumers in part of their dependence upon the Pennsylvania coking coals. Indeed, it is not easy to see how that increase of iron production in the West, for which every one looks, is to take place, unless these Virginia beds can be made use of.

But it is not a distant trade alone which the Chesapeake and Ohio road has for its dependence. Many furnaces are already at work along its line. Others are building, coal and iron mines are opening, agriculture is improving, and with a new road to carry their products, the inhabitants of the lovely mountain land of Virginia are preparing to make good the expectations which are so often expressed of the wealth and prospective power of that part of the country. A large and constantly increasing line business may fairly be expected for the road, and that local industry is what every man desires for the South.

The line of the road has been examined by Prof. THOMAS S. RIDGWAY, formerly of the Geological Survey of Virginia, and next week we shall give some of his conclusions upon the geology and prospects of the coal fields through which it passes. The road itself is of the best construction, wood trestlework having been avoided and iron alone used in its bridges. Its financial agents are Messrs. FISK & HATCH, and its bonds have been successfully placed upon the market, so that it possesses the means for completing its equipment. It connects the city of Richmond with the town of Huntington on the Ohio. Beyond this point surveys have been made for lines to connect it with the great Western net-work of roads. In all respects, the new company begins life with the most hopeful prospects.

Objections to Road Steamers Answered.

BY J. K. FISHER.*

SEVERAL objections have been made to road-steamers, which I deem unfounded—certainly unproved. One was that steam will be blown off while stopping for passengers. Locomotives stand a great part of their time with steam up; and while standing they blow 1-32 as much as when running. The damper being closed, *no* steam is made by the tubes, and the firebox makes steam but a quarter as fast as the whole; and without draft makes so little that locomotives stand six hours without blowing off steam, until just before starting, when it is necessary to strengthen the fire. The greatest effort I have observed of the live-steam jet in the chimney is to raise the pressure 25 lbs. per minute, without draft it would not be one-eighth as much. The stops of a street-steamer would not exceed 30 seconds, and the increase of pressure would be within 2 lbs.—not so much as is desired to aid in starting. The safety valve, which is not to regulate working pressure—would be set to avoid blowing off at stops or on grades.

Another objection is, that steamers are not adaptable to pick up traffic—the objector preferred to ride in horse-cars rather than wait for the Greenwich street steam-trains. We propose that steamers shall stop as horses do; and the implied assumption that they will stop seldom is erroneous.

Another objection was, that steamers need easier grades than horses. I believe the contrary, for these reasons: 1st. Mr. THURSTON proved that a five-ton steamer drew the load of twenty horses up a grade of one in twenty-five. The horses weigh ten tons; therefore, on grades they exert double power to overcome the gravity of the motor. 2d. It is a maxim of road-makers that the steepest grade should be such that a carriage will barely run down without help. Now, here is a design of a steam-carriage, made before this trial. Its engines have 600 lbs. tractive force when the mean effective pressure is 100 lbs. The back pressure is 15 lbs for the atmosphere, and the engine friction 5 lbs., together 20 lbs.—one-fifth as much as the tractive force. The weight with average load is 3,000 lbs.; therefore, on this grade, one in twenty-five, on which the resistance just balanced the tendency of the wagons to run down, the resistance to the carriage wheels rolling down would be 120 lbs., and the engine resistance also 120 lbs.—double the usual resistance. This maxim, applied to a road of this quality, for steamers, requires maximum grades of one in twelve and a half; but for horses it requires one in twenty-five. Of course steamers should have easy grades, but they need them less than horses do, and this may warrant considerable saving in road-grading in hilly regions. 4d. In descending, horses cannot run fast to make up for time lost in ascending, but a steamer can run as fast as it can fill its cylinders with steam of half atmospheric pressure, and make nearly the average speed it would make on a level. So far, then, as concerns steamers with good springs, hills are far less disadvantageous than they are for horses. The engines, to stop and start quickly, and work expansively to the desired degree, must be large enough to ascend steep hills—in fact, to get them over bye-roads, they must have power almost to slip their wheels.

Another objection was, that railways are more economical. In 1862, when Poor's Railway Book was published, I summed the payments of capital and dividends, with compound interest from dates. One favored that if a third of the capital had been put at compound interest, it would have amounted to more than the dividends and the then market value of the stock—that is, two-thirds of the stock had been lost. Many lines had never returned a dollar, but been sold to pay debts. *Some* railways are profitable; but if road-steamers had been put on the lines of others, vast losses would have been avoided; and if the road-steamers had not paid on some of these lines, they could have been removed to other lines. We have proved that they can work profitably, and we demand proof, and not mere assertion, that they cannot work with profit, where they have only horses to compete with. The competition of railways is said, by some English writers, to have been the chief cause of the non-continuance of road-steamers, but that competition was a partial or total loss of the capital of the railways, on the lines where the road-steamers should have run. In our great cities this is strikingly true; several of the London lines pay no dividends, and their stock is not quoted; and the Metropolitan, which has been the bul railway, whose stock sold for 1.30, and lately sold at .58, does not warrant a hope that any such line in any city will pay. And whoever insists on discouraging steam-carriages by advocating such lines ought to show reports that they have somewhere paid.

Some months ago Mr. W. H. VANDERBILT went to Europe to see these railways. Some weeks ago the New York *Times* said the Vanderbilt Quick Transit Line was not to be built, and the Three-Tier Line, or the Gilbert Elevated Line, is to be built. Did Mr. VANDERBILT find reason to doubt the favorable reports which the New York papers have published about the Metropolitan, while charters for imitation of it were before the Legislature?

Lastly and practically, I propose a Club to *test* this question, the following to be its conditions:

1st. The Club not to be committed to any patentee or inventor, but free to choose the best plan, old or new.

2d. Its objects to be, primarily, scientific information and amusement; and, if it appear that the invention can work profitably, its secondary object will be to control it, so that street-steamers shall be decent and accommodating.

3d. $3,000, and as much more as may be offered, to be raised in shares of $100. A share may be owned by several, but must be represented by one.

4th. Votes by proxy to be allowed.

5th. The investment to be deemed a liberal hazard: if the shareholders get only information and sport they are to be content; if profit accrue, they are to share it as they may agree.

6th. *Donations* to entitle the donors to double votes on questions relating to the use of steamers in the streets of New York.

I will take one share, and if my plan be chosen, I will take four more, if that be necessary, to make up the sum required.

* Read before the Polytechnic Branch of the American Institute, Dec. 6, 1872.

A Platinum Coinage.

M. JOUGLET discusses in the *Moniteur Scientifique* the subject of a platinum coinage. He first touches upon the suitableness of aluminium as a substitute for copper and bronze, but reaches an unfavorable conclusion. His opinion is that the metal is not a suitable material for this purpose; but if there are invented cheaper methods for the production of aluminium, some of its alloys might be suitably used for coinage. Next, we have the enumeration of the properties of metals in general, so as to render them suitable for coinage. These properties, partly inherent to the metal itself, partly due to its intrinsic value (comparative scarcity) are all possessed in a high degree by platinum, which has been in use as a coin in Russia, but was demonetized by the imperial ukase of June 22, 1845, the reason being that at and before that period the proper methods of working and refining platinum were not well understood. In this respect, however, the researches of Drs. H. SAINTE-CLAIRE DEVILLE and DEBRAY, and Messrs. JOHNSON and MATTHEY, have made such changes, that there would now be no difficulty in the working of platinum into coins, and, unlike gold and silver, it would be proof against forgery, on account of its high specific gravity. So far back as 1799, experiments were made at the French Mint, at Paris, for the purpose of converting platinum into coins, and DUVIVIER produced at that period some beautiful specimens of platinum medals. This metal is still largely used for the same purpose in France.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
JOHN A. CHURCH, E. M.
Editors.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees.

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THE SCIENTIFIC PUBLISHING COMPANY.

WILLIAM VENTZ, SECRETARY.
27 Park Place,
P. O. Box 4404. NEW YORK CITY.

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As we supposed, Mr. LOISEAU had no intention of asserting that the Indiana Block Coal is the only one that can be used raw in the blast-furnace. A clerical error led to the omission of one line from his manuscript, that line reading, "or other bituminous coal possessing the same peculiarities" (as the Indiana coal). He desires us to make this correction.

ACCORDING to private advices from Montana, the gold yield of 1872 is thought to have fallen short somewhat of that of 1871, because of the scarcity of miners, many of whom have migrated to the silver districts of Utah, Nevada, Arizona (the new Wallapai or Hualpai district), etc,, where they get profitable employment throughout the year, instead of the precarious and brief season of gulch-mining. On the other hand, the development of silver mines in Montana has made wonderful progress during the year, being stimulated by the activity which has reigned in the Territories further south. It is believed by many that Montana will prove as rich in silver as Nevada. About one million pounds of silver ore were, in 1871, hauled in wagons to Corinne, a distance of 400 to 500 miles from the different mines. It is said that in every case the ore so transported has paid a profit to the miners. This being selected ore, of course proves nothing as to the average quality of the vein matter in the mines. What Montana, like every other mining district, chiefly needs, is such a combination of capital, skill, and facilities of transportation and communication as will permit the profitable reduction of low-grade ores. Under present disadvantages, which, fortunately, if the Northern Pacific Railroad continues to advance with the same rapidity as heretofore, will not long remain a hindrance, the citizens of Montana can only demonstrate, without "realizing," the value of their silver mines. Yet occasionally we hear of an operation which is not only promising, but profitable. Thus the *Legal Tender* mine, near Argenta, in Beaverhead County, was sold about a year ago for $5,000; and the owners have since sold ore on the dump to the value of $70,000 cash. The mine is now bonded at $400,000.

The American Society of Civil Engineers.

We have commenced with the present volume the publication of the proceedings of the American Society of Civil Engineers. In our last number we gave the proceedings of the meeting of November 20. 1872; in our present number we give the meeting of December 4, 1872. Next week we shall give the proceedings of Dec. 20, 1872; and, since the meetings of the society are held fortnightly, we shall soon "catch" up with them, and thereafter publish the reports promptly, as soon as they can be prepared. The meetings are held on the first and third Wednesday of each month, at the rooms of the society, 63 William street, New York. The dates and hours for the present year are as follows:

Jan. 1, at 1 o'clock	P. M.	June 4, at 1 o'clock	P. M.
" 15, at 8 "	P. M.	" 18, at 1 "	P. M.
Feb. 5, at 1 "	P. M.	July 2, at 1 "	P. M.
" 19, at 8 "	P. M.	" 16, at 1 "	P. M.
Mar. 5, at 1 "	P. M.	Aug. 6, at 1 "	P. M.
" 19, at 8 "	P. M.	" 20, at 1 "	P. M.
Apr. 2, at 1 "	P. M.	Sep. 3, at 1 "	P. M.
" 16, at 8 "	P. M.	" 17, at 1 "	P. M.
May, 7, at 1 "	P. M.	Oct. 1, at 1 "	P. M.
" 21, at 1 "	P. M.	" 15, at 1 "	P. M.

Annual meeting, Nov. 5, 1873; Fifth Annual Convention, May 14 and 15, 1873, at Louisville, Kentucky.

The present officers of the society are HORATIO ALLEN, President; JULIUS W. ADAMS and JACOB M. CLARK, Vice Presidents; GABRIEL LEVERICH, Secretary; JAMES O. MORSE, Treasurer; ALFRED W. CRAVEN, THOMAS F. ROWLAND, JOHN BOGART, GEORGE S. GREENE, and FRANCIS COLLINGWOOD, Directors.

The high standing of this society, and the extremely interesting and valuable character of its professional papers assure us that the publication of these reports will be useful and welcome to our readers. Our columns now contain regularly the proceedings of the leading association of civil engineers, and the only association of mining engineers, in the country—in addition to which, we publish from the transactions of the Polytechnic Branch of the American Institute and of other scientific and technical societies, such papers and discussions as are suited to the objects of the JOURNAL.

The Combustion of Hydrogen.

We showed last week that no theoretical or practical gain, whether of heat or of temperature, is involved in the combustion of fuel containing water. In that demonstration, we assumed, for the sake of argument, that the water of the fuel is decomposed by the carbon, and that the hydrogen thus liberated is oxydized again to water-vapor. We also showed that, assuming these reactions to be complete, they affect only so much water as the carbon can decompose, namely, about three parts of water to two of carbon, which is nearly the amount contained in the best air-dried wood. For so-called *wet* fuels, therefore, such as green wood, or wet tan, or air-dried peat, the reactions referred to have no significance, since they do not affect the excess of water.

It remains now to be mentioned, that even under favorable conditions—namely, large excess of carbon and of oxygen, and consequent high temperature—the re-combustion of hydrogen is not complete. Mr. LOWTHIAN BELL has pretty clearly shown (*Chemical Phenomena of Iron Smelting*, page 118), that hydrogen may exist to the extent of from 5 to 10 per cent. of the volume of carbonic oxide in the escaping gases of an iron blast-furnace, when coke or charcoal is the fuel. As he says (page 114), whether the decomposition of water is a source of real loss of heat depends on the condition of the hydrogen when it escapes. If it is not oxidized, but free, the economy of the combustion is less than if the water had merely been vaporized and expelled, without decomposition.

English Stock Jobbing and English Criticism.

Our readers will bear us witness that we have always welcomed with unfeigned heartiness the closest criticism of mining stock companies and their management and have endeavored to contribute our share to the necessary work of repressing indecent and dishonest operations. But there is a kind of fault-finding with which we have no sympathy. When the elements of the case under discussion are, first, a mine in a distant country, and second, the management of men in the critic's own country, and that management is proved to be improper, if not obviously misleading, we submit that it is wrong to impute low morality and a disregard of the first principles of business honor to the country in which the mine is situated, while the country, which is the home of the offending directors, is held up to the world as the snug harbor of commercial virtue. It seems to us that when English buyers set about the purchase of an American mine in such a way that pecuniary loss is not only probable, but often inevitable from the start, it is overshooting the mark to make a violent onslaught on the American seller. It is not our purpose to discuss or defend the principles of commercial morality. We are only declaring what is constantly acknowledged in every country, when we say that every man has the right to buy as cheap and sell as dear as he can. It is the common fashion of the seller to value his wares dear, and if he finds a buyer, that buyer alone, and no other person, is responsible for the transaction, unless fraud is used.

We are led to these remarks because one of our most valued mining contemporaries, the London *Mining World*, has for some months exhibited a very absurd peevishness whenever an American mine was mentioned, and has abounded in expressions which indicate that, in its editor's view, Americans are, what is vulgarly called, a "scaly set," and know nothing of that sensitive commercial honor which, according to its own view, obtains in England. So far as we have been able to learn from its own pages, in thus criticising the people of this country it does exactly what we have complained of in the opening of this article. English inventors rush blindly into foolish ventures at the beck of a few clever *English* manipulators, and when the transaction is ventilated the "Yankee" ha

to hear the sweeping assertion that honor is either dead, or has never made its appearance in his country. In proof of this we will cite an example which appears in the *World* of December 7, 1872. It is an article upon certain revelations concerning the "Canadian Copper Pyrites and Chemical Company." Our contemporary says:

Our Canadian fellow citizens, whom those who have had smart experiences in trading, are in the habit of characterising as combining the Greek with the Jew, seem resolved that the "Dominion" shall not be behind the "States" in "doing a good thing," where somebody is to be done and well done. For sharpness and smartness we know of nothing in the experience of Utah or Nevada, or along the whole range of the Pacific Coast, from Coaly Coos downwards, more truly in the Yankee "Excelsior" style than what has transpired within the last few days in our Vice-Chancellor's Court in London, and the cooler regions of Glasgow, as reported in our last week's number.

The uninitiated reader would judge from this paragraph that some sharp Canadian had bamboozled a company of British stockholders, who may be fools, but can, at all events, claim that knavery is far from their thoughts and their acts. But although that is the plain import of the paragraph, he who should read it in that manner would be entirely in error. The company of foolish English investors certainly exists, but they were manipulated not by a Canadian, but by a *Scotchman!* If we understand the story rightly, this gentleman, for himself and friends, took 500 shares in the early days of the project and thereby gave it a certain stability which had its share in influencing others to subscribe. He was one of the principal projectors, and he sold out either before the shares were allotted or very soon after, leaving the smaller fish to wriggle out of a bad bargain as they best could. So much for the dealings of "Our Canadian fellow citizens."

But that is by no means the whole fable of the innocent British lion in the toils of the astute Canadian (?) fox. A number of gentlemen buy a property in Canada, for £175,000 and pay £165,000 of the amount (we suppose in successive installments) and when there remains but £10,000 of the money unpaid they have a meeting and the chairman informs them that the remainder will not be paid until the managing director has gone "over each property in detail and compared what is handed over with the particulars given at first by the vendors," and has seen that all is right. Even at this stage of the proceedings it turns out that the prospects of a dividend are of the smallest kind. But who is to blame for this state of affairs? If that transaction had been between one American and another, we think the common verdict in this country would be that the man who bought a costly property without making himself reasonably sure of its value deserved no sympathy when it proved to be worthless; just as a man who buys land without assuring himself that his title is good gets no sympathy from business men, whatever their standard of morality. His loss comes from his own folly.

The criticisms of the *World* in this case are peculiarly unjust because the very number of the paper in which this editorial is published contains also a letter that proves that the practices which it so ingeniously transfers from British to American shoulders were really largely employed in floating this company. The writer says:

Is it, or is it not true—rumors of a very authentic-looking kind say it is true—that the promoters were sold by several Glasgow men of good position in the following way?—A. B. is a merchant of good standing—good capital—has all the prestige of success in everything he puts his hand to—has performed very successful and therefore honorable operations in shares of this company and that company—has consequently a reputation for sagacity—has risen to be a leader of men on the Exchange. Promoter of Pyrites Company goes to solicit the weight of his highly respectable name on the board. A. B. regrets he cannot do them the favor, but is willing to take 1,000 shares if the promoters will guarantee an allotment to that extent. "Oh, certainly; we will guarantee you 1,000 shares. But may we request that you will apply at the earliest?" A. B. promises. He sends in his application for 1,000 shares at 9 A.M. precisely on the morning when the company is first advertised. The promoters and directors seize the sacred paper with Mr. A. B.'s application for 1,000 shares with delight—rush round the room with it—show what Mr. A. B. thinks of the company—and make the bit of paper a lure for scores who venerate in Mr. A. B.'s success what they believe to be Mr. A. B.'s judgment, &c., &c. A rush is made on the shares of the company Mr. A. B. thinks so highly of. Meantime, the promoters have been selling and buying at a premium the company's shares. They rise to £2 or £3 premium. Mr. A. B.—seizing the opportunity to secure for himself the reward due to him for the use of his magical name—goes quietly into the market and sells his 1,000 shares at from £2 to £3 premium: and the promoters, of course, buy them at that premium as nobody else would. In fact, £2,000 or £3,000 is the price the promoters pay him for the use of his name as a large and early applicant. Now, I want to ask the directors whether it is, or is not, within their knowledge that this game was played by several highly respectable parties in Glasgow on the floating of the Pyrites Company.

The evil which this letter describes is well known in this country, and those who practice it are called in plain words stock gamblers. But when these things are done in San Francisco we don't write down the London Stock Exchange as immoral. We cease to call the men who do them "highly respectable parties," and on the contrary fence them about with warnings which any man who moves with proper caution is sure to receive, in case he proposes to deal with them.

We would instance other things in this case which illustrate the false mode of criticism of which we complain; but this article is already long enough. We will only say that it is not through "American sensitiveness" that we object to the treatment which this and similar cases so constantly receive in the English papers. On the contrary the editor of this paper will not only receive with thankfulness and publish in these columns, fair criticisms of American mining management and mining law, but will also use all his official influence as Commissioner of Mining Statistics to bring them to the knowledge of our lawgivers. But do not let us confound the vices of British stock jobbers with those of our own speculators.

American Society of Civil Engineers.

A regular meeting of this society was held at its rooms, in New York, on Wednesday afternoon, December 4th.

A paper was read upon "Rail Economy," by C. P. SANDBERG, C. E., of London, in which, under the three heads—Iron Rails, Steel Rails, and Traffic Capacity—the author deals with the saving that may be effected in the item of railway cost.

IRON RAILS.

The American demand for English rails, of say 500,000 tons yearly, is unlikely to diminish soon. The late increased expense of iron adds to the cost of railroad construction, and tends to reduce the quality of rails. Welsh rails were often imperfect in weld; now they are, sometimes, also brittle. In the Cleveland district, rail-making has greatly improved, chiefly by the increased application of fettling in the puddling furnaces. Still, the buyers must guard against lamination and brittleness by tests for strength and wear, applied before the rails are laid.

Rails made of suitable iron, with a proper section, will not break in winter. In Scandinavia, with a climate more severe than in America, no accident has occurred from broken rails, though cross sleepers are exclusively used. But a very small portion of the iron rails shipped to America will stand the proper tests.

No late improvement promises so much to perfect iron rail-making as mechanical puddling, which now seems to be an entire success. Among the best appliances for this purpose are those of Danks and Spencer; one producing the whole charge in one ball, and the other in several small ones. By this improvement more rails can be made, at a reduced cost and of better quality.

STEEL RAILS.

The demand during the past year has been so great for steel rails, that they can hardly be obtained at any price. The supply is limited by the lack of ore free from sulphur and phosporus, and recourse has been had to extensive mines in Spain. It is hoped that America will supply herself with steel rails, and import only those of iron, required for new lines, or light traffic. There is a scarcity of suitable ore for the Bessemer process throughout Europe, except in Sweden, which the recently discovered coal there will render more available.

The Siemens-Martin process of steel-making—superior to the Bessemer in requiring a less pure ore—has, thus far, produced so little that it can hardly be called a source of supply in the great market.

Steel rails are now so well made that they rarely break, except when the flange is punched, and this should be done only while the metal is hot, or the notch drilled and then slotted. Although a steel rail is generally thrice as strong as an iron one, when punched, or the flange is cracked, the iron may be the stronger. The steel is made as soft as possible, say with one-third of one per cent. of carbon; for not by hardness, but by homogeneity, is it superior to iron.

Usually a steel rail will carry one-fifth more dead load than an iron one; hence, for the same traffic, the steel rail, in comparison with the iron, should not be reduced in weight more than 20 per cent.

Buyers should require each rail to be permanently marked, to indicate date, maker's name, and quality, that subsequent use may determine which manufacture is best.

TRAFFIC CAPACITY.

The amount of wear or life of a rail is usually expressed in tons passed over it before rejection. Properly the speed of travel should be taken into account, and 220,000,000 speed tons is a fair expression of the endurance of extra iron rails.

The average life of iron rails in England for ordinary traffic is about ten years; in and near London it is two years, or less; on the Continent from twelve to fifteen years; and in Sweden, with less traffic than in England, from fifteen to eighteen years.

The weight passed over good iron rails, before rejection, has been found to average 10,000,000 tons. This may be taken to represent the life of extra iron rails, and six times that the life of good 56-pound steel rails. On the "London and North Western" line steel rails have lasted twenty times as long as iron; and on the "Metropolitan Railway," with the greatest traffic in the world, where iron would not have lasted six months, steel will stand from three to four years.

In comparing the relative economy of superior iron rails and those of steel, prices of each per ton being taken at £7 and £11, and interest on capital five per cent., the yearly saving per mile would be £4 where iron rails would last fifteen years, and were used; £10 where they would last ten years, and steel were used; and £78 where iron rails would last but five years, and steel were used.

A table was given showing the gross load in tons which each quality and weight of rail may be expected to carry during its life, and the conditions were stated therewith to aid in the selection of rail to accommodate a given traffic; an important matter, since many European railways are laid with too heavy rails, and American with too light ones.

Equally important with the weight of a rail, is a proper section. In England the double-headed rails are still generally used, and elsewhere in Europe the flat-bottomed pattern, as also in America.

A specially bad section is the Erie 61-pound rail, which could be replaced by a 45-pound rail, well proportioned.

Prof. RANKIN says the weight of the rails per yard in length should equal fif-

teen times the greatest load on the locomotive drivers in tons. PERDONET, in France, takes twelve, in place of fifteen; the writer, by adopting a section which permits a fish-joint stronger than the others in general use, to be made, takes ten, and less; thus, for a 60-pound rail, the weight on drivers is put at 6¼ tons.

Fish-plates of steel will enable rails to carry from fifteen to twenty per cent. greater load than if iron were used of the same section; they will cost, per ton, about £1 less than steel rails, and the iron about £1 more than iron rails; hence, the adoption of steel fish-plates will be of benefit even with iron rails.

Mr. MACDONALD remarked that Mr. SANDBERG, in taking 6¼ tons weight per locomotive driver as a safe load on a 60-pound rail, differs from the best practice in this country. The "Philadelphia and Reading R. R.," on rails made with great care by the company, prefers not to exceed four tons on a 64-pound rail, and the rail section has been gradually increased to counteract wear and tear, from even this medium load.

On the "Erie Railway" 5 4-10 tons weight on drivers has beed found too great for best 70-pound iron rails, and with a speed, for heavy freight trains, of fifteen miles per hour, should not exceed 4½ tons.

Mr. ALLEN remarked that this was of great personal interest to him; his first railway report dealt with the question of weight upon drivers, and showed the need of keeping it below certain limits. If greater weight is to be carried, the number of drivers should be increased; and the time will doubtless come when locomotives with eight, ten, and even twelve drivers will be used. In no way has more money been wasted in the construction and operation of railroads than by increasing the weight upon drivers, to the great injury of road bed, rails, and rolling stock.

Engineering and Mechanical Notes.

About 70 per cent. of all the so-called accidents which occur on British railways must be classed under the head of collisions. It is impossible to have a collision without losing money. The experience of years has fully demonstrated the truth of this proposition. A little collision may be had for an outlay of about £25. A great one involving considerable loss of life can scarcely be had at a less price that £29,000. We have no means of determining accurately what is the average cost of a collision, but we believe that we shall not be far wrong if we estimate the direct loss to such a company as the London and North-Western at about £10 per mile per annum. This is meant to include all expenses, as well those incurred in effecting trifling repairs to engines and goods, trucks, due to a small "pitch in," now and then, as the weightier matters of compensation, legal expenses, and doctors' bills, proper to a heavy collision.

Experiments made by the British Torpedo and Gun-Cotton committee prove that a charge of gun cotton, saturated with water, can be fired by electricity with a detonating fuse. Other trials showed that, under the conditions observed, nitrated gun-cotton possesses slightly more power than ordinary gun-cotton; that picric powder is quite equal, or very nearly so, to gun-cotton in explosive power; and that both gun-cotton and picric powder are infinitely superior to gunpowder.

A great drainage scheme is on foot in Italy. Most continental travellers are acquainted with that vast expanse of water in Northern Italy known as the Ferara Marshes, covering nearly two hundred square miles of what was once the most fertile land in Italy. An Anglo-Italian Company has been formed for the purpose of reclaiming these watery wastes, and plans for accomplishing the work were solicited from the most celebrated hydraulic engineers in England and on the continent, and the choice fell on Messrs. JOHN and HENRY GWYNNE, of Hammersmith, England, to whom the contract for the whole of the machinery has been given. The body of water to be drawn off the land is over 2000 tons per minute, and as the consumption of fuel was a consideration of primary importance, these gentlemen have guaranteed that the maximum consumption of coal shall not exceed 1¾ lb. per indicated horse-power per hour, and to deliver the whole of the machinery in ten months. The engines will be on the compound surface condensing principle, of 1400 horse-power, working centrifugal pumps, and, we believe, are the first that have been constructed for drainage purposes on this principle.

Decay of Stone.

DR. R. ANGUS SMITH has made some interesting observations upon the deterioration of stone through the influence of the acids that fill the atmosphere of cities, especially those which are bituminous coal burners. He found that even the most silicious stones, which from their composition would be thought acid-proof, are really very seriously affected. His experiments grew out of the excessive decay in stones observable in so many English cities. Believing the acid in the rain to be the cause, he supposed the endurance of a silicious stone might be measured by its resistance to acids. He proposed, therefore, to use stronger solutions, and thus to approach to the action of long periods of time. He tried a few specimens in this way, and with most promising results.

Pieces of stone of about one cubic inch in size were broken, by allowing a hammer to fall upon them, the number of blows required to produce fracture being counted. Similar pieces were steeped in dilute acid; both sulphuric and muriatic were tried, and the latter preferred. The number of blows now necessary was counted. Some sandstones gave way at once, and crumbled into powder, some resisted long. One very dense silicious stone was but little affected. It had stood on a bridge (in a country place, however,) unaltered for centuries.

These trials are merely the beginnings of a very extensive set of experiments about to be undertaken by Dr. ANGUS SMITH, with a view to establish a standard of comparison.

MINING SUMMARY.

California.

IDAHO MINE—ANNUAL MEETING.

From the Grass Valley *Union* of Dec. 17.

Yesterday evening the annual meeting of the stockholders of the Idaho Quartz Mining Company took place at the Company's office, the Banking House of Findley & Co. The stock was pretty much all represented. The Superintendent, Edward Coleman, made his annual report. The report is complete in all its details, and from it we give the following data:

The fiscal year ends on the 2d of December 1872. The outlay on permanent improvements, for the year, has been unusually large. These improvements were found to be necessary in order to work the mine on as large a scale as the underground developments require. We now have a thirty-five stamp mill and two rock breakers, with all the modern appliances for saving gold and sulphurets. These are driven by a twenty-inch engine, forty-four inches stroke, and it is believed that with the usual repairs incident to running a quartz mill, but little expense will be incurred in running the mill, for years to come. The hoisting works are all complete and in good running order. There are two engines, fourteen inches in diameter of cylinder, and five feet of stroke for hoisting the cages. There are two ten-inch cylinder engines, of sixteen inch stroke, for hoisting tubs and for use in sinking the shaft. They are all set on solid foundations of masonry, as is, also, the mill engine. The underground work connected with the new shaft has been pushed on continually during the past year. The timbers used in keeping the shaft open are as follows: fourteen inches square from the 400 foot level to the 200 foot level, twelve inches square from the 200 foot level to about eighty feet from the surface, and thence to the surface, timbers of fifteen inches square are used. We have now on hand nearly all the timbers required to complete the shaft to the 600 level. These are fifteen inches square. I again take pleasure in reporting the condition of the mine as encouraging, and with the increased facilities of working, it may reasonably be expected that the profits for the coming year will largely exceed the profits of any preceeding year. I have also to report that all the business and the affairs whatsoever connected with the mine are in a satisfactory condition. I would also call your attention to the apparent increase in the working expenses of the milling and mining of the ore. This was caused, necessarily, by preparations for working the mine on a larger scale, and of which the future will get the benefit. During the past year we have run 590 feet of "drifts," made 189 feet of "raise," and completed 389 feet of new shaft. The shaft is now completed to the 400 level. We have, also, raised a small working shaft from the 500 level to the 400 level, and we are now opening out for the timber at the 500 level. During the year we have crushed 11,410 tons of ore. Of this 950¼ tons came from the 400 level, 7805½ tons from the 600 level and 2654¼ tons from the 700 level. The 400 level is in to 285 feet from the new shaft; the 600 east level is in 584 feet from the line of the old shaft, or 414 feet from the new shaft, and the 600 west level is into the line of the Eureka mine. The 700 west drift is in seventy-four feet from the old shaft, and the 700 east drift is in 190 feet from the old shaft, or nine feet from the run of the new shaft.

The yield of the mine has been 22,331 46-100 ounces of bullion, valued at	$390,830 59
81¾ tons sulphurets	8,872 10
Specimens and tailings	762 73
	$400,465 42

or an average of $35 09 per ton.

COST OF MINING AND MILLING.

Surface Labor	$21,482 75
Underground	80,323 49
Wood and Poles	12,244 94
Candles and Oil	3,477 13
Hardware and Steel	4,328 02
Lumber and Coal	2,310 08
Powder and Fuse	1,071 56
Foundry	2,306 69
New Ropes and Sundries	1,659 09
Superintendent's Salary	3,000 00
	$133,203 75

SULPHURETS.

Labor saving 81¾ tons	$1,340 00
Reducing 78 tons	2,084 15
Grinding sand from creek	270 10
	$3,694 25

CONSTRUCTION ACCOUNT.—MILL.

Labor	$6,745 75
Lumber	3,706 42
Foundry	23,340 97
Hardware	2,099 46
Sundries	2,796 82
	$38,689 42
Additional Quicksilver	$690 00
Copper Plates and Hose	1,172 56
	$1,862 56

DITCH AND RESERVOIR.

Labor, etc	$1,375 23

NEW SHAFT.

Labor, surface	$3,577 50
Labor, underground	16,954 75
Lumber and materials	9,264 89
	$29,797 14
Ropes, cages and cars for new shaft	$4,067 75
Retimbering old shafts and drifts	$2,794 00

HOISTING WORKS.

Foundry	$12,561 15
Materials, etc	13,869 27
	$26,430 42

GENERAL EXPENSE.

Insurance	$1,730 00
Law Expense	450 00
Pump for old shaft	352 50
Estate of J. S. Henning	5,000 00
Expense on Bullion	1,997 20
Prospecting east end of claim	144 00
	$9,673 70

RECAPITULATION.

Mill and Mining	$133,203 75
Sulphurets	3,694 25
Retimbering	2,794 00
General Expense	9,673 70
	$149,365 70

CONSTRUCTION ACCOUNT AGGREGATE

Construction—Mill	$38,689 42
Hoisting Works	26,430 42
New Shaft	29,797 14
Ditch and Reservoir	1,375 23
Quicksilver, etc	1,862 56
Ropes, cages and cars	4,067 75
Total Construction	$102,222 52

RECEIPTS.

Cash on hand from last settlement	$16,972 40
Rec'd from 22,331 46 100 ounces Bullion	390,830 59
81¾ tons Sulphurets	8,872 10
Specimens and Tailings	762 73
Chinese lease	100 00
Water Rent	700 00
Pan Rent	270 00
Extraordinary	2,500 00
Total Receipts	$421,007 92
Total expenditures including dividends	414,338 22
Balance on hand	$6,669 70

EDWARD COLEMAN, Supt.

SECRETARY'S REPORT.

The Secretary M. P. O'Connor, made a report which necessarily contains much that

is not in the Superintendent's report. We collate from the Secretary's report the following:

Number of shares of stock 3,100, or one foot to the share. Of these 2,880 shares are owned in Grass Valley, and 220 owned by non-residents of this place. The par value of a share is $100

The total

RECEIPTS

From all sources for the year 1872, to December 16th amount to	$404,035 52
Balance in Treasury at commencement of the year	16,972 40
Total for the year	$421,007 92

EXPENDITURES

for the year are as follows:

Dividends	$162,750 00
Other disbursements	251,588 22
Total	$414,338 22

For the

LAST FOUR YEARS

the total earnings of the Idaho mine have been as follows:

1869, ending in Dec.	$306,038 75
1870, ending in Dec.	183,450 23
1871, ending in Dec.	407,301 16
1872, ending in Dec.	404,035 52
Total for four years	$1,300,822 66

DIVIDENDS

for the same years have been paid as follows:

1869, 11 dividends	$170,500 00
1870, 8 dividends	87,200 00
1871, 12 dividends	232,500 00
1872, 11 dividends	162,750 00
Total 10 dividends	$432,650 00

This result has been accomplished, so far as the mill arrangements are concerned, with fifteen stamps. The Idaho has now thirty-five stamps, but the thirty-five stamps have been running only a few days, and no gain has been made by them for the year just closed, but rather a loss of time.

TRUSTEES

The stockholders proceeded to the election of Trustees, to serve for twelve months, with the following result: Thomas Findley, John C. Coleman, Edward Coleman, James Simpson and M. P. O'Connor.

This was a re-election. The Trustees organized by electing Edward Coleman, President and Superintendent; Thomas Findley Treasurer; John C. Coleman Vice President, and M. P. O'Connor Secretary.

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The next meeting of the Institute will be held Tuesday, February 18, 1873, in Boston, Mass. Prof. T. STERRY HUNT, and Prof. W. H. PETTEE are the local Committee of Arrangements.

II. All members and Associates who pay their dues ($10,) for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

Those members and associates who have not paid their dues for the current year, are requested to do so at once. Money may be sent in postal orders, checks or bank bills, to the Secretary, THOMAS M. DROWN, 1123 Girard street, Philadelphia, Pa.

III. It is expected that the more important paper, read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which those Members and Associates will be entitled who have paid their dues.

IV. All authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

V. The ninth rule has been amended, so that there will be hereafter three meetings a year, in February, May and October.

THOMAS M. DROWN, Secretary.
1123 Girard street, Philadelphia, Pa.

Advertisements.

The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the Organ of the* AMERICAN INSTITUTE OF MINING ENGINEERS, *and is regularly received and read* BY ALL THE MEMBERS AND ASSOCIATES *of that large and powerful society,* THE ONLY ONE OF THE KIND IN THIS COUNTRY. *It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country, and presents the very best means of reaching that very important class of men.*

Rates of Advertising.

The rates of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

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For Hoisting and Conveying Material to any Distance by Wire Cables.

Smoke-burning Safety Boilers. Oscillating Engines, Double and Single, ½ to 100 horse-power. Centrifugal Pumps, 100 to 100,000 gallons per minute. Best Pumps in the world; pass mud, sand, gravel, coal, grain, etc., without injury. All light, simple, durable and economical.

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oct-15-1y

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Oct.1.1.year

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COUNSELLOR-AT-LAW.

Especial attention given to Purchase and Sale of Mines; and Examination of Title and Certificates thereto.

Jan. 7.2mo No. 97 Kimball Block, SALT LAKE CITY.

SUBSCRIPTIONS are invited to a book of Metallurgical Tables and Furnaces, to be prepared by T. EGLESTON, Professor of Metallurgy and Mineralogy in the School of Mines, New York. The tables will include all that is to be found in authoritative writers concerning cost, production, composition of ores, fuels and fluxes, manufacture of brick, construction of furnaces, preparation of fuels, and all other operations; weights and measures of foreign countries compared with our own. The furnaces are to be represented by carefully executed wood cuts and it is designed to present in the volume a graphic illustration of all the principle constructions used in the metallurgy of the day. Price $10. Subscriptions received by Prof. T. EGLESTON, School of Mines, New York, P. O.

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ANALYTICAL CHEMISTS
AND
CONSULTING METALLURGISTS.
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THOMAS M DROWN. GEORGE F. CORLISS.

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Advice in Patent Law given free. mar 8:tf

LAFLIN & RAND,

POWDER CO., 21 Park Row, opposite Astor House, New York,

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BLASTING POWDER,
SAFETY FUSE,
ELECTRICAL BLASTING
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Dec. 31:tf

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"The leading Engineering Journal of the world," indispensable to every Civil, Mining, or Mechanical Engineer, can now be obtained post-paid at $9 30 currency, by remitting Post Office order to NEW YORK OFFICE "ENGINEERING," 52 Broadway.

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EXECUTED AT THE OFFICE OF
The Engineering and Mining Journal.
27 PARK PLACE, NEW YORK CITY.

MISCELLANEOUS.

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Sweet's Excelsior Steel Tire,
Swede's Spring Steel,
Cast Spring Steel,
English Spring Steel,
Sleigh Shoe Steel,
Cutter Shoe Steel,
Frog Point Steel.

Nov. 19:1y

FURNACES, RANGES, STOVES.

SANFORD'S PATENT CHALLENGE HOT AIR FURNACES,

STATIONARY, or PORTABLE, very powerful and economical, always satisfactory;

New York Fire Place Heater,

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a variety of Choice PORTABLE RANGES, and first-class COOKING STOVES; also the famous

BEACON LIGHT BASE BURNERS,
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THE NATIONAL STOVE WORKS,

Nov. 19:10t 239 & 241 Water street, New York.

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Office, corner Fifth Avenue and Smithfield Street, Pittsburgh.

Our central location enables us to draw from both sides of the Allegheny Mountains Metals and Ores best adapted for making a No. 1 Rail, and together with our Improved Machinery, are a sufficient guarantee of our ability to produce Rails of a quality unsurpassed for durability and strength, by any foreign or domestic manufacture.

New Patterns, of any desirable weight, made to order on Short Notice.

We respectfully solicit orders for New Rails, or Re-rolling. June 26.1y

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KINGDOMS OF PRUSSIA AND SAXONY.

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Is ready to receive consignments of

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For the above-named Works.

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Nov. 21:1y

MISCELLANEOUS.

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May 17:1y

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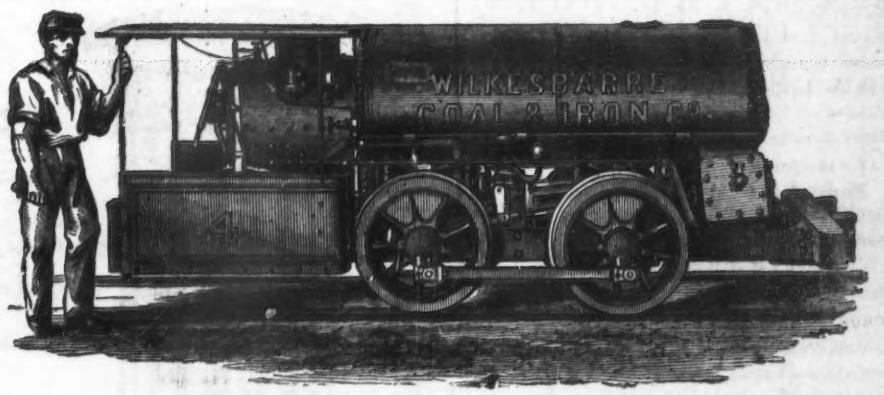
OXIDE OF ZINC, SPELTER, SHEET ZINC.

Jun28:1y SPIEGELEISEN CINDER FOR BLAST FURNACES.



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Gauge, two feet six inches or upwards; Hight above rail, five feet four inches; Width over all, five feet one inch. Adapted to burn Anthracite or Bituminous coal or coke.

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Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition

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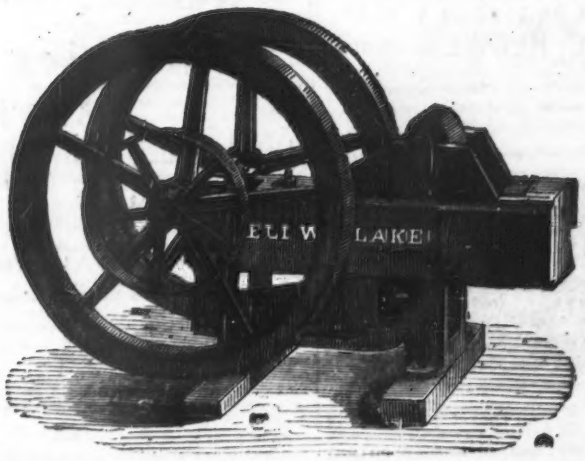

The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparator to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

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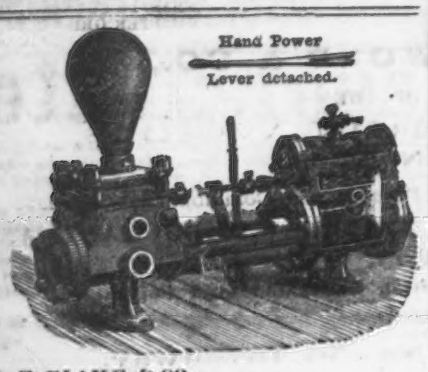

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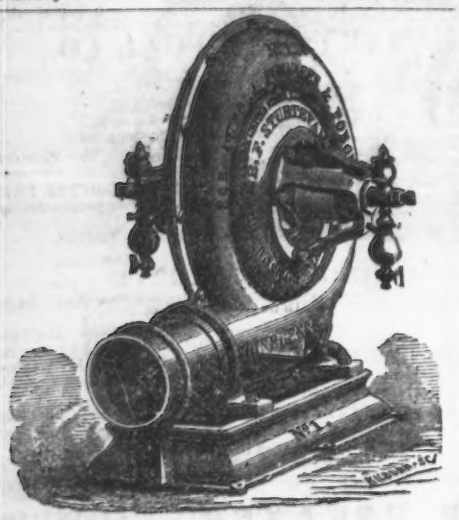

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n29:1y

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Minerals and Ores in which the difference of specific gravity is so slight and which are also sometimes in such fine particles as to defy separation by any other machinery or method, are rapidly separated by this Concentrator.

Mr. W. Bement, of Georgetown, Col., concentrating Silver ores, says: "I am satisfied your machines can not be beaten; they are simple, require no power (comparatively,) and do not get out of order."

A comparison is challenged between the results obtained by the approved methods of water concentration and the complete system of dry-ore concentration in the amount of ore saved, quantity concentrated, economy of working, and comfort of the operators and workmen

Parties interested in mining are invited to call at No. 210 Eldridge street, New York, where they may see a machine in operation and have samples of their own ores crushed and concentrated.

For information and circulars, apply to

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MISCELLANEOUS.

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Troy, N. Y., May 3, 1872.

B. F. Sturtevant, Boston, Mass.,

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ENGINES, IRON WORK, ETC.

JOSEPH NASON'S VERTICAL TUBE RADIATORS IN VARIOUS SIZES AND PATTERNS.

JOSEPH NASON & CO., 61 BEEKMAN ST., corner of Gold street.—WROUGHT and CAST-IRON PIPES; all kinds of STEAM and GAS FITTINGS; Apparatus for WARMING and VENTILATING BUILDINGS.

JOSEPH NASON. HENRY R. WORTHINGTON.

nov29-1y

Something New!

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It will be largely devoted to information concerning foreign and home countries, especially with those places remote from the general rush of travel. This information will be profusely illustrated by fine engravings from original sketches. The recent discoveries in science, relating to explorations and journeyings of travellers, inventions of pains-taking laborers in the field of the practical arts, the discoveries of celebrated chemists, physicians, botanists and mineralogists will be noted as they occur.

An original illustrated article on Naples will be published, besides other original tales, sketches of life and character, poetry and various literary papers from the pens of writers of the first talent.

The editorial staff will be under the direction of L. DE COLANGE, LL. D., so well and favorably known as the editor of "ZELL'S ENCYCLOPEDIA."

The publisher will spare no pains or expense to make this magazine well worthy the reading public, and has placed the subscription price so low as to be within the reach of all.

Subscription price, $2 00 per annum.

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A specimen copy will be sent to any part of the United States on receipt of 10 cents in postage stamps.

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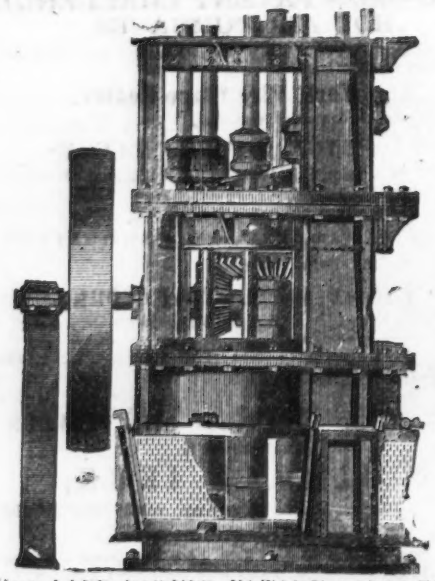

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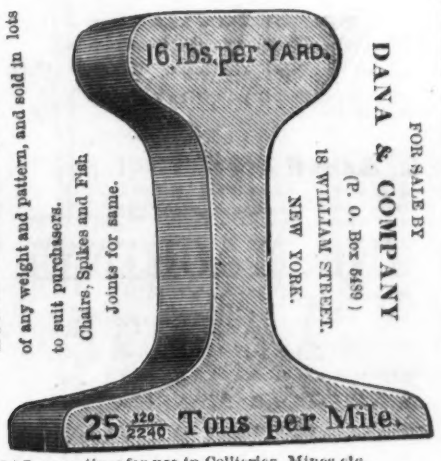

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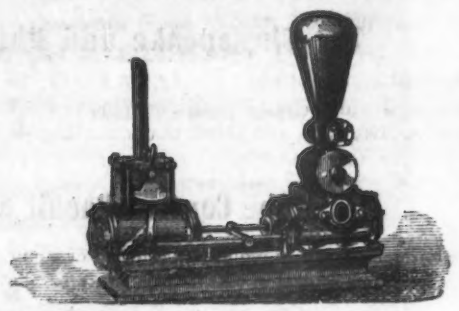

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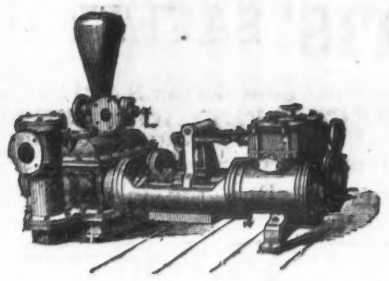

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